ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

A French firm, in describing an automobile to a prospective purchaser in New York city, wrote as follows: "The motor is equilibrated and avoids the trepidations."

An artesian well in Clapham, London, 425 feet deep, yields 840,000 gallons of water a day.

Two of the five new $3,000 mail cars built by the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., for the government, were put in commission the other day, for use along the lines to East New York and the foot of Broadway. The cars are used exclusively for mail purposes, and the motormen and conductors will wear the postal uniform.

The results of an elaborate investigation on the protection of iron and steelwork from rust have led Herr Julian Treumann to the conclusion that certain Japanese lacquers form by far the most satisfactory coverings. They are strongly adherent, and resist sea water, steam and acids, even at high temperatures.

Lingi Galvani, the great anatomist of the Bolognese school, and better known for his discovery of animal electricity, received on Sunday, December 4, at Bologna, the honor of a centenary celebration. The date chosen was that of his death, which took place on December 4, 1798. The occasion drew the presence of the leaders of the local medical school, and its orator was Signor Erminio Vitta, representing the committee of Italian telegraphists now organizing a similar commemoration of Alessandro Volta. The proceedings were highly successful.

A correspondent of our London namesake writes from Johannesburg, South Africa, as follows: "It seems to me that a better way than the methods now in use for making pipes, etc., of copper by deposition would be to bring the copper sulphate solution to the mandrel in the form of a jet, issuing from a nozzle, at such a high speed that there would be considerable pressure on that part of the mandrel immediately affected. If this worked, it could be applied in many directions —statuary, etc. I would also suggest that other substances, such as pellets of rubber, copper, etc., be incorporated with the swiftly rushing solution; the continual battering of these upon the freshly deposited copper might help to make the grain close and even."

The street railways of St. Louis employ 3,900 men. They own 334 miles of track—300 of electric and 34 of cable. Last year they carried 113,000,000 passengers. A car fare, owing to the issuance of children's tickets, is estimated at 4.85 cents. On this basis of calculation the street railways of St. Louis in 1897 collected $5,500,000 in fares.

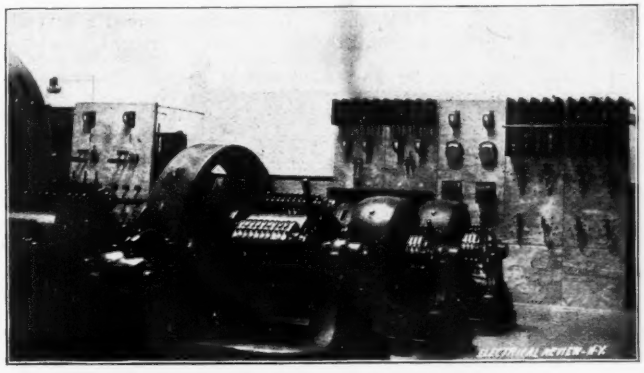


FIG. 1.—"BUFFALO'S NEW LIGHT AND POWER STATION"—VIEW OF ROTARY CONVERTERS AND MOTOR GENERATORS FOR EXCITING FIELDS.

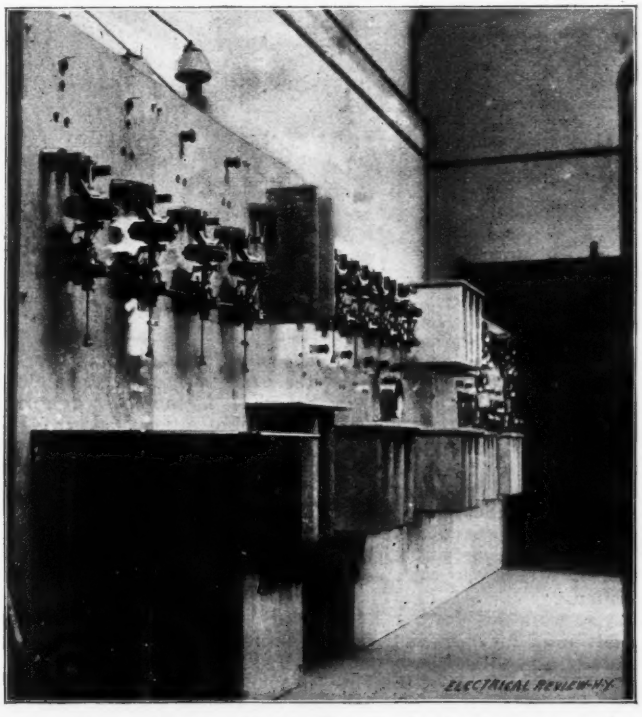


FIG. 2.—"BUFFALO'S NEW LIGHT AND POWER STATION"—VIEW OF STATIC TRANSFORMER-ROOM, SHOWING HIGH-TENSION CIRCUIT BREAKERS.

BUFFALO'S NEW LIGHT AND POWER STATION.

NIAGARA POWER FURNISHES CURRENT FOR BUFFALO'S ARC AND INCANDESCENT LIGHTS.

About January 1 all customers of the Buffalo General Electric Company were notified that the current supplied would be changed in frequency from 16,000 alternations per minute to 7,200 alternations per minute, and advising them to make any necessary changes in motors and other apparatus affected by the change to 60 cycles.

The transformers at the various residences having previously been replaced and provided with connections such that at a moment's notice the entire system might be changed without interrupting the service.

The cause of this change was the introduction of Niagara power and the starting of the new light and power-station just completed. The accompanying illustrations give interior views of the new installation.

The ELECTRICAL REVIEW several weeks ago gave the first description of this plant with illustrations of the static transformer-room and several of the large 250-kilowatt step-down transformers at that time in place. There are now installed in this room 12 of these enormous converters, receiving the current at 11,000 volts from the Niagara line and reducing the pressure to 375 volts, at which voltage it is conducted through the various switchboards to the rotary converters and synchronous motors driving the arc machines and great incandescent alternators.

Besides these 12 static transformers there are in place four huge machines of the same capacity and general type, except the reduction in potential, which is from 11,000 volts to 2,200 volts, and the current from these machines is to operate the motors of the Urban Flour Mill, which is about ready for operation.

Just within the main dynamo-room stands the alternating switchboard, receiving the current from the static transformers and controlling the six 200-horse-power synchronous motors

which furnish power for the Brush arc machines. These motors operate at 352 volts and 25 cycles each, driving two 125-light arc dynamos at 500 revolutions per minute.

The arc machines are direct connected to armature of motors, and generate a current of 9.6 amperes at 6,250 volts potential. Twelve of these arc machines at present are used for lighting the streets of Buffalo by Niagara power, and provision is made for machinery to duplicate this output as desired. The arc switchboard is located at the opposite end of the room, and the entire arc equipment is of the latest and best design.

The incandescent lighting circuits of the city are supplied from two large alternators in the main dynamo-room, each operated by a three-phase synchronous motor of 565 horse-power. The motors are controlled from a special switchboard at the left, which receives the current from the static transformers at 352 volts at 25 cycles, and operates the motors at a speed of 375 revolutions per minute.

The alternators each deliver a current of 92 amperes and 2,200 volts at full load, and a frequency of 60 periods per second.

The alternators are excited by a direct current of 125 volts, furnished by machines near at hand.

Two motor generators are in operation. The motors are 30 horse-power each, and operate at 350 volts and 25 cycles. To each is direct connected a continuous-current machine, capable of delivering at 125 volts potential a direct current of 160 amperes.

Near these motor generators are two rotary converters, having each a capacity of 800 amperes at 125 volts.

The alternating side of these rotary transformers receives its current at 80 volts potential at 25 cycles, and the speed of the machines is 750 revolutions per minute.

Three special static transformers are installed on a platform nearby, for supplying the necessary current for these rotaries at 80 volts instead of 352 volts, as is the case with the other alternating apparatus.

The remaining apparatus of the present installation is two large rotary converters for supplying the 500-volt power circuits about the city, most of the consumers having small motors, but in the aggregate amounting to several hundred horse-power.

There are at present but two of these rotaries, but provision is also made for an increase in capacity.

The speed of these rotary converters is 758 revolutions per minute, and the capacity 264 amperes at 550 volts. The alternating side receives the current at the usual frequency and voltage of 25 cycles and 352 volts.

The Buffalo General Electric Company are now ready for supplying the consumer with Niagara power for alternating or direct-current motors of small and medium sizes, and the Cataract Power and Conduit Company are in the field for power of large or small units with rates such that many factories and power users are applying for the current as fast as can be made ready.

FRANK C. PERKINS.

Buffalo, N. Y., January 13, 1899.

The Fort Wayne Electric Corporation.

The following notice has been sent out from Fort Wayne, Ind., by the Fort Wayne Electric Corporation, in reference to the death of its former president, Mr. Ranald Trevor McDonald:

FORT WAYNE, IND., December 31, 1898.

It is our painful duty to announce to the friends, customers and all who have had dealings with this company the death of Ranald T. McDonald, the late president and general manager of the company. While on a business trip to New Orleans, La., and Dallas, Tex., he contracted a severe cold, which resulted in grippe and double pneumonia, and finally in his death at the latter city on the 24th instant, at 11 o'clock A. M.

Mr. McDonald was the founder of the electric manufacturing industry of this city, and by his great energy and wise counsel contributed very largely to whatever measure of success has been attained by the present organization.

However, while his death will be keenly felt by all his business friends and associates, it will not materially affect the business affairs of this corporation except that it will necessitate the election of a new president. This election will occur in due course of time, and, when made, will be announced to all persons interested.

FORT WAYNE ELECTRIC CORPORATION.
By CHAS. C. MILLER,
Secretary and Treasurer.

New Forms of Household Electric Heating Apparatus.

The development of electrical apparatus for heating, which was so long considered a difficult and well-nigh impracticable problem, has now been brought to a high degree of utility. Various manufacturers are at present producing a variety of forms of heating apparatus adaptable for nearly every purpose, including soldering and curling-irons, flat-irons and ornamental designs of heaters for houses, cars and many special applications.

We illustrate herewith several electric heaters of recent development, which are particularly desirable for household uses, manufactured by the H. W. Johns Manufacturing Company, of New York. Fig. 1 is a bracket, three-way switch electric house heater; that is, it has a three-way switch, which permits three regulations or three temperatures. Fig. 2 is practically the same form of apparatus, but having only one regulation of temperature.

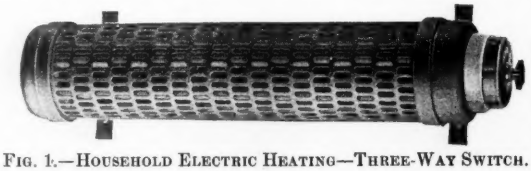


FIG. 1.—HOUSEHOLD ELECTRIC HEATING—THREE-WAY SWITCH.

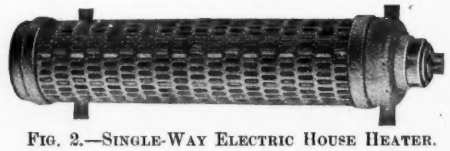


FIG. 2.—SINGLE-WAY ELECTRIC HOUSE HEATER.

The Johns's cylindrical heaters, shown in Fig. 3, are constructed on the same mechanical and electrical principles as those shown in the preceding illustrations, but are furnished with bases permitting their being readily moved about. These are made in black japan, bronze, with silver or gold, or otherwise decorated, and are particularly ornamental for use in households, hotels, offices or yachts.

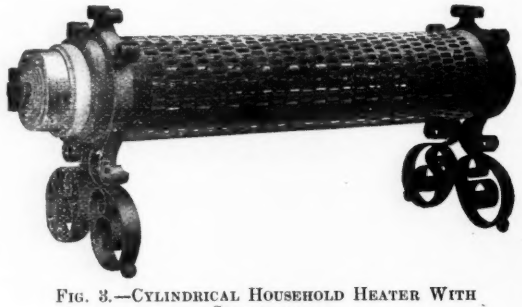


FIG. 3.—CYLINDRICAL HOUSEHOLD HEATER WITH STANDARD.

FIG. 4.—ELECTRIC HEAT PAD FOR APPLICATION IN CASE OF SICKNESS.

Another adaptation of electric heating which this company has developed is that of the electric pad or "electrotherm," as shown in illustration, Fig. 4. The pad is soft and pliable, and may be applied to any part of the body, and by many physicians it is considered far preferable to the old method of water-bottles, compressors, etc. The pad is readily connected to the ordinary lighting circuit, and the heat is easily regulated, so that the patient may lie in bed and get whatever constant degree of heat is desired.

The Troubles of the Electric Light Companies in Washington City.

There has been for some time considerable rivalry between the United States Electric Light Company and the Potomac Electric Power Company, both of whom supply current for public and private use; each watches the other to see that no advantage is gained by one over the other.

Last Fall the United States Electric Light Company obtained permission through the District Commissioners to relay their underground conduits on Fifteenth street. The Potomac Electric Power Company claim that this action on the part of the commissioners was unlawful, and that the United States Electric Light Company were not taking up their old ducts, but were adding new ones; that the work of the United States company could not be called "repairs no how," so the Potomac company sought the assistance of the courts to enjoin the commissioners and the United States company from proceeding further. The case was reported in the ELECTRICAL REVIEW at the time.

The court has just handed down its decision and upholds the contention of the Potomac Electric Power Company, thus restraining the United States company from proceeding.

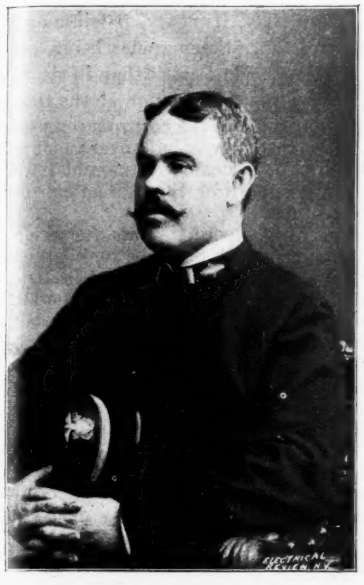
Meanwhile, to allow the companies to connect up various sections of their systems sometimes, only separated the width of the street, permission has been given in special cases to make the necessary extensions.

The trouble over these extensions has caused a discussion of the advisability of allowing individual companies to lay ducts of their own, the contention being that the city—District—should own them all, so that all comers might use them, allowing of free competition.

At the inauguration of Governor Roosevelt at Albany, N. Y., the 10,500 electric lights in and on the staircases of the capitol were illuminated The lights cost the state $48,000 a year. The capitol has cost $24,000,000 up to date. It is practically finished, as Governor Black promised it would be when his term ended.

From the Navy to the Electrical Industry.

In this issue is presented a portrait of Walter Martin McFarland, passed assistant engineer, U. S. N., who has resigned to accept the position of assistant general manager of the Westinghouse Electric and Manufacturing Company. Mr. McFarland entered the Naval Academy in 1875 and graduated in 1879. Mr McFarland is regarded as one of the brightest men in the Engineer Corps. No officer has a higher professional standing. He won a cadetship to the Naval Academy



PASSED ASSISTANT ENGINEER W. M. MCFARLAND, U. S. N., RESIGNED TO ENTER THE ELECTRICAL FIELD.

in 1875 through a competitive examination among the male scholars of the public schools of the District of Columbia, and was an honor man in his class on graduation. At the International Congress of Marine Engineers and Naval Constructors in London during the Queen's Jubilee he represented the United States Government.

In a dispatch from Washington, D. C., it is stated that this resignation is another instance of the feeling among naval officers that the service does not offer sufficient inducements for men of ability in scientific work. The pay of naval officers is less than that of army officers, and one cause of dissatisfaction in the Engineer Corps has been the failure of Congress to act on the Personnel bill so that the engineer officers would be relieved of their present anomalous position in regard to rank and command. A number of naval officers have resigned in recent years to accept lucrative positions with private concerns. Some have become professors in colleges and others have gone to shipbuilding, electrical and ordnance firms. Mr. McFarland, it is stated, will receive more than three times his salary as a naval officer and twice as much as he would get on reaching the highest grade in his corps.

OUR CHICAGO LETTER.

In connection with the Cycle Show, which is being held in the Kieth Building this week, there are several exhibits of motor carriages made by leading manufacturers in that line. The American Electric Vehicle Company show their line of carriages on the first floor, together with one on the third floor in running order, making trips around the hall. The Fisher Equipment Company have an exhibit in which they show several carriages of the latest design, and have also a carriage running on the third floor. Another exhibitor is the Oakman Motor Vehicle Company, of Greenfield, Mass., showing the Hertel motor carriages, which are built by them. The several manufacturers say that inquiries have been numerous, and the public interest will be greatly increased as a result of the exhibition.

It is reported that the Minneapolis General Electric Company, of Minneapolis, which will control the electric lighting of that city, has been formed. Lee, Higginson & Company, bankers, and Stone & Webster Company, of Boston, have practically consummated the organization. The company has an authorized bonded debt of $1,500,000. This amount will be issued in common stock and about $600,000 in preferred. F. E. C.

Chicago, January 14.

The "Willard" Battery Patent.

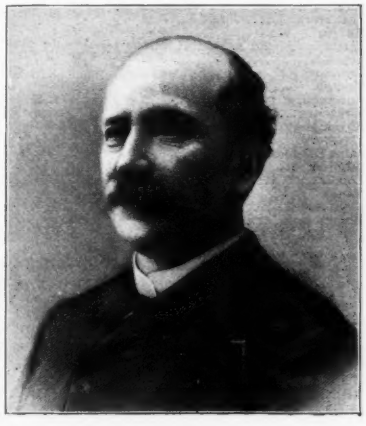
In patents numbers 617,003 and 617,004, issued under date of January 3, 1899, to E. T. Willard, the inventor of the "Willard" type of storage battery, now manufactured by Messrs. Sipe & Sigler, Cleveland, Ohio, is described some variations of this battery as it has been heretofore known.

The patent describes a grouping of the plates in cylindrical form, somewhat similar to the original Plante cells, a nest or group of cylinders of different sizes being arranged one within another and connected up alternately, positive and negative. These cylinders have the usual ledges, shelves or projections formed in this case into a continuous helix from top to bottom of the cylinder and inclined upward and outward, giving a series of saucer shaped shelves. Similar projections may be formed on the inside of the cylinders. These dish-shaped ledges give more durable retaining walls for the active material.

In the patents also is described a battery made up of a large number of these tubular electrodes, small in diameter and not concentric, the ends being hermetically sealed and containing a solid stiffening core, the whole giving a form designed to stand the severe buckling and warping actions of the abusive service of electric vehicle work, for which these batteries are proving to be particularly well adapted.

The New National Carbon Company.

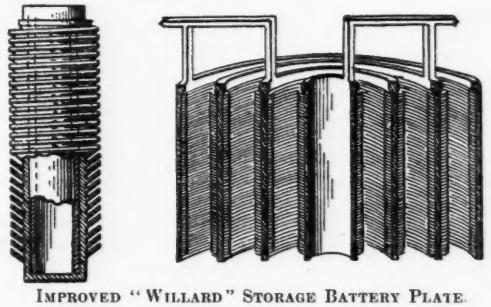
The head of the New National Carbon Company is Mr. W. H. Lawrence, of Cleveland, Ohio, a pioneer manufacturer of electric light carbons, and a gentleman of means



PRESIDENT W. H. LAWRENCE, OF THE NEW NATIONAL CARBON COMPANY.

and high standing, widely known in the electrical field. A portrait of Mr. Lawrence is presented on this page.

The companies included in the purchase are the following: National Carbon Company, Brush Carbon Works, Standard Carbon Works, Cleveland, Ohio; Crouse & Tremaine Carbon Company, Fostoria, Ohio; Thomson-Houston Carbon Company, Fremont, Ohio; Faraday Carbon Company, Jeanette, Pa; Phœnix Carbon Company, St. Louis; American Carbon Company, Noblesville, Ind.; Washington Carbon Company, Solar Carbon and Manufacturing Company, Pittsburgh; Partridge Carbon Company, Sandusky, Ohio; Globe Carbon Company, Ravenna, Ohio.



IMPROVED "WILLARD" STORAGE BATTERY PLATE.

The National Carbon Company is organized under the laws of New Jersey, will have a capital of $10,000,000. The following directors have been elected, with two additional ones to be added: W. H. Lawrence, president National Carbon Company; Myron T. Herrick, president Society for Savings, Cleveland, and receiver of Wheeling & Lake Erie Railroad Company; James Parmelee, president Cleveland Electric Illuminating Company, vice-president Cleveland Electric Railway Company; James Humbird, president Washington Carbon Company, Pittsburgh; D. D. Dickey, Jeanette, Pa., president Faraday Carbon Company; Webb C. Hayes, Cleveland, Ohio; J. C. Van Blarcom, cashier National Bank of Commerce, St. Louis.

AN OUTSIDE COMPANY.

The following would indicate that a large carbon manufacturing company was not included and that lively competition may be expected:

TO THE EDITOR OF ELECTRICAL REVIEW:

Enclosed herewith you will find several newspaper clippings of the leading Cleveland papers relative to the consolidation of all the carbon plants of the United States.

These articles are misleading and are liable to misinform the electrical trade, and we desire to call your attention to the fact that the United States Carbon Company, which is thoroughly equipped with the largest and most improved carbon machinery in the world and is prepared to manufacture and supply all varieties of electric light carbons, is in no manner connected or associated with the new carbon trust. We would respectfully request that in your notice of the consolidation you would prominently mention this fact, so that the electrical trade will not be misled to believe that the United States Carbon Company is included in the consolidation.

The articles now being published claim that all the carbon companies in the United States are in the consolidation, which does us a great injustice. Very truly yours,

The United States Carbon Company,
CECIL L. SAUNDERS,
Vice-President.

Cleveland, Ohio, January 13, 1899.

Meeting of the Northwestern Electrical Association.

The annual convention of the Northwestern Electrical Association will be held at the Hotel Pfister, Milwaukee, this week, beginning to-day. This successful organization is always well attended, and the meetings instructive and interesting.

A full report of the proceedings will be published in our next issue.

FOREIGN ELECTRICAL NEWS.

Telegraphing Without Wires—Some interesting experiments have lately been made by M. Ducretel in telegraphing without the aid of wires. The tests were carried out between the Eiffel Tower and the Panthéon, in Paris, a distance of four kilometers. In spite of the heavy fog which prevailed at the time the tests were made the transmission of the messages between the two points is said to have answered the expectation of M. Ducretel, who intends to repeat his experiments from the Eiffel Tower to the terrace at St. Germain, a distance of 16 kilometers.

Electricity on the Stage—Science plays a more or less prominent part in the theatrical business of to-day. The Parisian papers, both secular and scientific, have been devoting columns to the appearance in Paris of some American vaudevillists of the gentler sex whose dresses were bedecked with hundreds of minute incandescent lamps. And now it appears that the electric vehicle has found a rôle of its own on the stage. In a play now running in Paris the comedian Baron traverses the boards in an automobile, much to the enjoyment of the audience.

A Dog at the 'Phone—Among the passengers who alighted at Redhill station in England the other day, says a French contemporary, was a young lady who at once sought out the station master and complained, with tears in her eyes, that she had lost her poodle at Reigate station. The station master telephoned his colleague at Reigate, who replied that there was, in fact, at that moment in his office a dog which answered to the description given of the missing poodle, and which was found wandering about the station. The lady requested to have the ear of the dog placed to the telephone receiver, and proceeded to call him by name. The animal immediately recognized the voice of its mistress, began to bark, and ended by jumping up on the instrument, at the other end of which its mistress was speaking to her favorite, which was soon restored to her.

The Price of Electricity Per Kilowatt-Hour—At a recent meeting of the International Society of Electricians M. Pellissier presented some interesting details regarding the cost of electricity in certain towns in Europe. At Brussels the average price per kilowatt-hour is 60 centimes. The legal rate is 70 centimes, less a reduction of 20 per cent in the case of consumers of more than 3,500 francs' worth of electricity per annum. At Berlin the price is 70½ centimes, less a percentage of from five to 50 per cent. Public lighting is paid for at the rate of 50 centimes, less certain reductions. The Rhine Falls Company (Compagnie des Chutes de Rhine), at Reinfelden, charges 50 centimes per kilowatt-hour, with reductions reaching to 80 per cent. The following table gives the names of the various cities under review, with the average price per kilowatt-hour:

	Franc.
Cambrai	1.20 per kilowatt-hour.
Altona	1.20 "
Breslau	0.80 "
Frankfort	0.80 "
Havre	0.80 "
Berlin	0.70 "
Brussels	0.70 "
Hamburg	0.70 "
Munich	0.70 "
Nuremburg	0.70 "
Strasburg	0.70 "
Birmingham	0.70 "
Liverpool	0.70 "
Saint Etienne	0.70 "
Edinburgh	0.60 "
London	0.80 to 0.50 "
Nancy	0.60 "
Reinfelden	0.50 "
Manchester	0.20 "

Lighting with Alcohol—Certain of the daily papers in Germany and France are engaged in discussing the question of lighting by means of alcohol. The subject was broached at a meeting of agriculturists, who, in hopes of thus finding a use for their apples, were delighted at the idea, which they accepted without further discussion. There is every reason, however, to believe that the merits of alcohol as an illuminant have been exhausted, and, after the indications borrowed from the German papers, we await a more complete demonstration in order to modify our personal opinion of the subject. There is one point, however, to which we may call the attention of those interested in the matter: The flame from alcohol is not luminous by itself; and, if it is to be employed for lighting purposes, it will require the assistance of a foreign ingredient which, carried to a high temperature, emits luminous radiations.—*L'Electricité.*

Automobilism in Australia—The *Australian Courier* of November 27 informs its readers that interesting experiments with the electrical vehicle are in progress at Sydney, N. S. W. Our contemporary refers to automobolism as a "French industry," and commends the establishing of an automobile club at Sydney. It adds: "It is surprising that in Australia, where people pride themselves in possessing the sense of progress and initiative, the mode of traveling about the towns should be by means of uncomfortable cabs, hired at two shillings per hour, double the price paid in Europe, and that nothing has ever been done in the way of drawing attention to the development of the automobile. In Sydney, for example, and in its pleasant suburbs, the automobile would be received with joy."

Executive Committee Meeting.

The Executive Committee of the Fire and Police Telegraph Superintendents' Association will meet in Boston, January 28, on the invitation of Capt. Wm. Brophy, of that city. The members from New York will go over on the Fall River line, January 27.

RECENT DEVELOPMENTS IN ELECTRICAL ENGINEERING.

FROM THE PROCEEDINGS OF THE ENGINEERS' CLUB, PHILADELPHIA.

At the meeting of November 5 Mr. Carl Hering began some informal remarks on "Recent Developments in Electrical Engineering," in which he intended to review briefly those developments which have a direct bearing on the other branches of engineering.

Owing to the lateness of the hour, the present portion was limited to electric traction. After calling attention briefly to the phenomenally rapid development of the overhead trolley system, and giving some statistics, he showed that its chief competitors in densely built-up cities —namely, the conduit and a modified accumulator system — had recently been so perfected as to be now recognized as commercially practicable systems, especially the former, which is in regular use in several cities and is being introduced to a large extent in New York city, where it is fast replacing all the recently built cable roads. The only serious objection to the conduit system seems to be the great first cost as compared with that of the overhead trolley system; on the other hand, a very important advantage lies in the fact that both the lead and return wires are generally insulated, whereby the corrosion of underground water and gas-pipes, by the return currents, is entirely avoided. While there are only a few regular accumulator lines in use, the commercial success of which does not yet seem assured beyond a doubt, there are several so-called "mixed systems" in use, notably in Hanover, Dresden and Paris, which seem to be quite successful. In these the overhead trolley and the accumulator systems are combined, the latter being used for the densely built-up portion of the city, where the overhead wire is considered objectionable, while the trolley system is installed in the outlying portions. The accumulators are charged from the trolley line while the car is being run from that line. Present progress in the so-called surface contact systems seems to be limited to the making of inventions; there seems to be only one short line of this kind in actual operation; namely, at Monaco. Electric traction, he stated, has not only replaced horse traction, but is fast replacing the cable system, the legitimate field for which is being rapidly reduced to very narrow limits.

In the application of electricity to what may be called heavy traction, such as on the present steam railroads, progress has not been so rapid as was expected. What has been done, however, seems to have been very successful, and developments seem to be assured, in certain directions, at least; among these are the application on short lines with dense traffic, on feeders for steam railways, and over grades that are too steep for a locomotive with a train; on such lines electric traction is already a very serious competitor to steam traction. Even on some of the longer through lines electricity is now being introduced, notably in Italy, Hungary, Belgium and Switzerland. Steep grades being less objectionable in electric than in steam traction, the construction of the road is simplified and the cost reduced; an electric road may be built over a mountain, while a steam road would have to go around it or through an expensive tunnel.

Very high-speed traction, for which electric power is much better adapted than steam, seems to have made little or no progress. A number of elaborate projects have been worked out, but they are still only on paper. The difficulties encountered seem to be of a financial rather than of an engineering nature, as curves and grades must be avoided, and that is expensive.

Electricity is replacing steam on elevated roads, but both kinds of elevated roads seem to be seriously affected by the electrically operated surface roads, which are more convenient and, in general, only slightly less rapid, when the time in going to and from the stations is considered. It is probably only under specially favorable conditions—such as exist in New York city—that elevated roads will continue to hold their field. For underground lines nothing but electricity would be considered, the new cable lines in Glasgow being a notable exception.

For very steep mountain roads the three-phase alternating-current system is being used, apparently with success, especially in Switzerland; and it seems likely that no more new roads of this nature will be built for steam traction. In such regions cheap water-power is generally available. This cheap power, and the greatly reduced dead weight of the locomotive, give electric traction important advantages over steam-power on mountain roads. The best example of this kind of a road—namely, the railway up the Jungfrau, one of the highest of the Alps—was described, and some of the engineering data were given. The difficulties encountered in the glaciers, snow fields and avalanches were shown by means of a lantern slide. The first part of the road was finished this Summer, and it is expected that it will all be completed in the course of several years. Electricity is used very largely in the construction, both for power and for heating purposes. All the power is to be derived from waterfalls.

Street Railway Expansion in Washington City.

The City & Suburban Railway Company, the outgrowth of the old Soldiers' Home Railroad Company, now controls more mileage than any other company in Washington.

The City & Suburban Company is made up, first, of the Soldiers' Home Railway Company, the Belt Line Railway Company, the Anacosta Railway Company, all of which are horse railroads. The company acquired these lines in succession and afterwards the Tennallytown line, an overhead trolley line operating from Georgetown northward.

Very recently this company acquired the controlling interest in the Capitol Railway Company operating in Congress Heights. This company operated its line on the Braun surface contact system.

The whole of these lines are to be eventually remodeled to an underground system. The two-conductor underground contact system, constructed on a cable railway slot construction, is now being installed on the Soldiers' Home line and is to be extended to the company's other lines as soon as practicable.

Elevated Roads of New York City.

The elevated railroads of New York city did not do as much business for the year ended June 30, 1898, as they did in the preceding year, but the street surface railroad business increased. The State Railroad Commissioner reports that the total number of passengers carried by the elevated railroads was 227,776,552, a decrease of 1,019,129 as compared with 1897. The number carried by the elevated roads in the boroughs of Manhattan and the Bronx was 183,360,846, an increase of 395,995 as compared with 1897. The total number carried by the elevated railroads in the Borough of Brooklyn for 1898 was 44,365,706, a decrease of 1,465,124 compared with 1897. The street surface railroads of New York city carried as passengers the past year 456,963,753, including "transfers," an increase over 1897 of 57,538,010. The number carried in the Borough of Brooklyn (including some carried in the Borough of Queens) was 217,410,612, including "transfers," an increase over 1897 of 17,224,793.

At the annual meeting of the stockholders of the New Orleans, La., Traction Company, Limited, the following directors were elected: R. M. Walmsley, J. C. Denis, A. Baldwin, C.H. Hyams, Frank T. Howard, C. D. Wyman and John C. Russell.

ELECTRIC RAILWAY NOTES.

The barns of the Rochester, N. Y., Railway Company, on State street, were partially destroyed a few days ago, entailing a loss of over $50,000, fully covered by insurance.

The report of the Hudson, N. Y., Street Railway Company for the quarter ended September 30, is as follows:

	1898.	1897.
Gross earnings	$4,788	$4,571
Operating expenses	2,400	1,759
Net earnings	2,388	2,828
Other income	84	296
Fixed charges	927	932
Net income	1,545	2,192

The Chicago, Ill., & Fox Lake Electric Railway Company has increased its capital stock from $25,000 to $300,000, preparatory to building its line this year. Negotiations are still in progress with the North Chicago village board for a 50-year franchise.

The Columbus, Ohio, Street Railroad reports gross earnings for December of $62,260, an increase of $6,764 as compared with the same month of the previous year, and net $35,228, an increase of $4,767. For the six months ended December 31 the gross earnings were $687,572, an increase of $77,735 as compared with the corresponding period of the previous year, and net $355,429, an increase of $34,619.

At the annual meeting of the stockholders of the Omaha, Neb., Street Railway Company all the old officers were reelected as follows: President, Frank Murphy; vice-president, Guy C. Barton; secretary, D. H. Goodrich; treasurer, W. W. Marsh; general manager, W. A. Smith; general superintendent, F. A. Tucker; directors, Guy C. Barton, J. J. Brown, W. W. Marsh, S. D. Mercer, W. V. Morse, Frank Murphy, E. W. Nash, B. F. Smith and W. A. Smith.

At the annual meeting of the stockholders of the Worthington, Ohio, Clintonville & Columbus Street Railway Company the following directors were elected: George H. Worthington, F. D. Simons, F. W. Merrick, R. M. Weaver, O. W. Aldrich, William Pinney, T. A. Simons, Emmett Tompkins, F. N. Bandeleri, M. W. Crabtree and J. K. Burke. The election of officers resulted as follows: George H. Worthington, president; F. D. Simons, vice president; T. A. Simons, secretary and treasurer, and R. M. Weaver, auditor.

It is stated in well informed circles that the rise in Manhattan Elevated, New York, is because when Mr. Skitt consented to go into the company he was positively promised by Mr. Gould that he should have $12,000,000 to thoroughly equip the system with electricity. This money, it is stated, has already been raised, and announcement may come at any time. The contract for equipment is attracting the attention of the General Electric, Westinghouse (which includes Walker) and the Sprague, with the majority of rumors in favor of the contract going to the first-named company.

COL. JOHN N. PARTRIDGE, NEW YORK STATE SUPERINTENDENT OF PUBLIC WORKS.

COLONEL JOHN N. PARTRIDGE.

THE NEW SUPERINTENDENT OF PUBLIC WORKS A WELL KNOWN ELECTRIC STREET RAILWAY PRESIDENT.

Col. John N. Partridge, for over 10 years past president of the Brooklyn City & Newtown Railroad Company, of Brooklyn, has accepted the position of State Superintendent of Public Works, Governor Roosevelt tendering him the appointment on Thursday of last week. The Colonel is a native of Massachusetts, was a captain in the Civil War, and has lived in Brooklyn since 1865. He was in the battles of Roanoke Island and Newberne, and afterwards in the expedition to Goldsboro, N. C. In 1863 he was in South Carolina in the operations about Charleston Harbor. He was wounded in front of Fort Darling in 1864, and was honorably discharged on September 27 of that year. In 1882 and 1883 he was Commissioner of the Brooklyn Fire Department, and in 1884 and 1885 was Commissioner of Police and President of the Excise Board, both under the administration of Mayor Seth Low. He became president of the street railway company in 1886. During the railroad strike of 1895 this company was tied up three days only, while the strike on the other companies continued many weeks.

The street railway employés sent a large petition to Governor Roosevelt, endorsing Colonel Partridge's candidacy.

In 1868 Mr. Partridge joined the 23d Regiment National Guard as first lieutenant, and subsequently was captain, major, lieutenant-colonel and colonel. He served with this regiment in the railroad strikes at Hornellsville, in 1877, and later at Buffalo. He was greatly liked by the men and officers of the regiment, and is a gentleman whose sterling worth is respected by all.

Colonel Partridge is a leading member and official of the Brooklyn Riding and Driving Club, and is one of the best horsemen in that fine organization. A recent portrait is presented on this page.

At the annual meeting of the stockholders of the Black River, N. Y., Traction Company the following directors were chosen: J. A. Lebnecker, H. F. Inglehart, George H. Walker, B. B. Taggart, Joseph Kerementz, Charles W. Riker, B. Van Wagener. The following officers were elected: President, J. A. Lebnecker; vice-president, H. F. Inglehart; secretary, George H. Walker; treasurer, B. B. Taggart. The officers are the same as for last year. The directors reported that the situation was encouraging.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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The electric vehicle industry we believe will become, and that quite rapidly, one of the great industries of these United States.

One of the triumphs of the century has been the world-wide success attained by systematic irrigation of arid lands by impounding the water and snow-melts during the rainy seasons, and delivering the water where and as needed. The example has been followed, with perhaps greater success, in various methods adopted for irrigating stocks, and the harvests have been golden and abundant.

The union of the leading carbon interests of this country is of considerable interest to the electrical field, particularly to the electric lighting companies. We believe it is the intention of the new company to devote its facilities and skill to improving the quality of carbon without a material increase in price to the consumer. It is hoped that this will be the case, and we feel sure the intelligent men who form the board of directors of the new company, with Mr. W. H. Lawrence at the head, will take this view of the matter.

One of the great jokes of the century, whose perpetrators will be the laughing-stock of the next century, is the Rapid Transit Commission of this city. After years of pondering and disputing over the cost and character of a work which, at the best, will take many years of vigorous work, nothing is done, and not much promise of anything being done towards accomplishment of this crying need of our people. There is no more promising field for the display of energy for our new Governor, whose motto seems to be, "Be up and doing," in appalling contrast with the "Make haste slowly" of the commission, christened by mistake "Rapid Transit."

We note that the Consolidated Ice Company, of this city, is considering the adoption of electric delivery wagons. President Morse, of the ice company, is one of the progressive men of New York, and naturally turns to the best thing in easily controlled propulsion to assist the vast delivery business of the Consolidated company which he has established in New York as one of the solid institutions of the metropolis. We would advise him that electric power is the thing needed to replace his ice wagon teams, and it will be found equal to all the demands that may be made upon it. Else we do not know the men of progress at the head of the electric vehicle movement.

IS IT DANGEROUS TO USE CURRENT FROM TROLLEY CIRCUITS IN BUSINESS HOUSES?

TO THE EDITOR OF ELECTRICAL REVIEW:

We have under discussion the proposition of whether the use of a grounded trolley circuit to run motors in business houses is dangerous or not. I contend that it is dangerous to both life and property.

The street car companies contend that those are antiquated ideas, and that grounded circuits are not more dangerous than metallic circuits They made one connection, and I had them cut it off as soon as I found it out. They appealed to the City Council, and I made them the proposition that I would submit the matter to the highest authority in the country. I therefore ask that you write me your ideas on this matter strictly from an electrical standpoint. As I believe that this is a matter which concerns the public at large, I hope you will favor me in this matter. Thanking you in advance, I am,

Yours truly,
W. A. FRASER,
City Electrician.

Dallas, Tex., January 7, 1899.

Understanding the "grounded trolley circuit" as meaning the ordinary railway circuit with overhead line and feeder and rail return, we can see no special reason for alarm. It is largely a matter of thorough insulation and good work of installation. A well made motor well installed should not be dangerous just because the current is taken off a trolley line into a business house. The customary fuses and automatic switches afford as good protection as they could in a metallic circuit. The motor can be insulated very completely in the average business house, far more so than the motors under the cars, yet we seldom hear of any danger to passengers from the current. Five hundred volts pressure is not an excessive one, and many electricians have had the shock without hurt. It is certainly a very widespread practice of the railway companies of this country to sell power to many kinds of business houses, and so far as statistics are available nothing but good has resulted.

If the electric pressure were high, as it is in distribution circuits, the question might become grave. Or if motor insulation and safety presented any inherent difficulty, we might hesitate. No one gives a second thought to motors on 110 and 220-volt circuits. They are seen everywhere nowadays. It is a small step from 220 volts to the 450 or 500 volts of the railway circuit, and insulating and safety devices exist, making the latter as amenable to rule and practice as the former. Long ago the line was drawn after the best thought and study of the most competent designers, and about 500 volts was decided on as well within the limits of safe insulation and absence of danger.

Of course, where careless handling of motors occurs, shocks may be received which may be uncomfortable. But the same argument goes to such homely devices as hot kitchen stoves. Again, the wiring of the building might once in a while be badly done, and some heat developed. But municipalities, as a rule, insist on regulating such matters, and, in addition, the underwriters look out for their interests in the safe wiring of the property which involves risk.

With proper wiring of the building and proper insulation of the motor we see no reason to think the railway circuit any less feasible for use than the metallic circuit.

It is simply, we would say to our esteemed correspondent, all a matter of thorough installation of the motor and its accessories. Let this be looked after, and, if need be, adopt a set of rules which will insure its being done before the motor can be used, requiring, if need be, a certificate to such effect from a properly authorized and qualified electrical inspector. We hardly think we need here to make any suggestions as to what such rules and regulations should embody. Our correspondent would find no difficulty before him in respect to them if he should decide to allow such motors to be used.

Electricity and machinery have 48,000 square feet in the United States exhibit at the Paris Exposition of 1900. It will all be needed. Mr. F. E. Drake, of Chicago, is in charge of this department, and under his able guiding hand we expect to see an organization of important and modern apparatus worthy of the field and country it is drawn from.

LATE NEWS.

A fire occurred in the building occupied by Charles C. Wirt, manufacturer of electrical supplies, 1,028 Walnut street, Philadelphia, Friday, and destroyed electrical goods to the amount of $3,000.

The Westinghouse Electric and Manufacturing Company has received advices by cable that its newly organized French company has been awarded the contract for the electrical equipment of the Paris Metropolitan Railway. This contract is one of the most important in Europe. The apparatus will be built at the company's works at Havre.

It is reported from Boston that the American Bell Telephone Company may go out of existence as a Massachusetts corporation, transferring its interests to a new company, to be incorporated in New Jersey or some other state in which broad charter privileges may be secured. The capital stock is about $26,000,000, and there are now outstanding $5,000,000 debentures. The stock is now quoted at over 290, the market value of the $26,000,000 capital stock being thus nearly $75,000,000.

Pedestrians passing along Park Row, New York, Saturday night in front of No. 11 were startled as they stepped over the rise in the sidewalk by a sudden shock of electricity. Many persons after receiving the shock jumped into the air. A crowd soon collected which blocked the sidewalk. Upon investigation and experiment it was found that an electric wire, which runs from the Edison Company's subway in the street and about a foot under the sidewalk to the building at No. 11, was furnishing free shocks to all who happened to step on the sidewalk over the cable. The whole trouble was said to be due to the wet sidewalk.

Last week the old officials of the Nassau Street Railway, Brooklyn, N. Y., resigned and their places were filled at a regular election. Albert L. Johnson was succeeded as president by John E. Borne, president of the Colonial Trust Company. T. L. Johnson resigned as vice-president and treasurer. Hon. Hugh J. Grant was chosen to succeed him as vice-president, and C. D. Meneely as treasurer. Mr. Meneely is the auditor of the Brooklyn Rapid Transit Company. Secretary W. F. Ham withdrew his resignation as secretary at the request of the Rapid Transit directors. The new board of directors is composed of John E. Borne, Hugh J. Grant, C. D. Meneely, W. F. Ham, Mr. Bailey, P. H Flynn, Silas B. Dutcher and Frederick C. Cocheu.

Some Comprehensive Questions To Be Answered.

The ELECTRICAL REVIEW has received the communication published below, and if any of our readers believe they possess the information asked for, we shall be pleased to give their replies space.

The letter is as follows:

Will you kindly answer in your progressive and authoritative journal the following questions:

1. How much capital is invested in electrical plants and appliances for manufacturing purposes in the United States?
2. What amount of capital is invested in electrical motor power, of all kinds, in the United States?
3. How many men and women are engaged in the electrical business in this country?

Reliable statistics pertaining to this subject may not be readily accessible, but I am certain you must have them if anybody has.

January 6, 1899.

New York Electrical Society.

The meeting of the New York Electrical Society, at the College of the City of New York, on January 12, was largely attended.

The subject of the evening, which was "Latest Progress in Storage Battery Installations," was ably handled by Mr. Joseph Appleton, engineer of the construction department of the Electric Storage Battery Company.

The meeting was a significant illustration of the number now interested in storage battery application, and the audience listened with close attention to Mr. Appleton's record of the triumphant way in which the storage battery has vindicated the faith of its friends through years of doubt and opposition. The lecture, which was of exceptional interest throughout, was illustrated by a large number of lantern slides.

After the discussion, in which Mr. R. P. Bolton, Mr. Frank J. Sprague and Mr. C. O. Mailloux took part, the company visited the storage battery power substation of the Metropolitan Street Railway Company, at the foot of West Twenty-third street, where was seen in operation the large railroad battery of the company, equipped with all the modern appurtenances.

The following members were elected at the meeting: Arthur D. Dunn, electrical engineer, 164 East Eleventh street; Harvey E. Molé, J. S. White, & Company, 29 Broadway; James A. Stiles, Newton Appliance Company, 120 Liberty street; Henry I. Lurye, electrician, 110 East 109th street; Walter S. Wilson, 111 Fifth avenue; A. Haaber, New York Insulated Wire Company, 15 Cortlandt street; Eugene F. Roeber, Ph. D., 210 West Fourth street; Herbert Jenkins, New York Insulated Wire Company, 15 Cortlandt street; George V. Flynn, 26 Thames street; Arthur Diamant, 4 East Ninety-seventh street, all of New York city.

OBITUARY.

MR. JOEL C. CLARK.

Joel C. Clark, secretary of the New York & New Jersey Telephone Company, died at his home in Brooklyn on Wednesday morning of last week. The body was taken to his old home in Framingham, Mass., for burial. Mr. Clark was born in Hallowell, Me., in 1842, but moved to Massachusetts early in life. In Framingham he conducted a printing business, but came to New York some years ago and became interested in the telephone business. He was one of the incorporators and a director of the New York & New Jersey Telephone Company and of the New York & Pennsylvania Telephone and Telegraph Company. At the time of his death he was secretary of the former organization and treasurer of the latter. Mr. Clark was a man of much culture, and had been a contributor to several magazines. A widow, five daughters and two sons survive him. He had been in poor health for several years. General manager W. D. Sargent, and treasurer H. S. Snow, of the New York & New Jersey company, and general manager U. N. Bethell, of the New York Telephone Company, attended the funeral services at Framingham.

MILAN C. BULLOCK.

Mr. M. C. Bullock, the well known Chicago manufacturer of steam engines and other machinery, died January 12. He was very highly regarded by all who knew him, and was particularly kind to young men just starting in life. Mr. Bullock was 61 years old at the time of his death.

PERSONAL.

Mr. H. D. Bayne, a well known electrical contractor and engineer, of New York, has just returned from Chicago and the West, where he has been for some time superintending the installation of a number of large electrical installations.

Mr. Charles G. Burton has recently resigned from the Central Electric Company, after a long connection, to accept a responsible position with the Chicago office of the Sprague Electric Company. Mr. Burton is well known throughout the electrical industry of the West, having been identified actively with various electrical enterprises for the past 15 years. Mr. Burton's unique work as an advertisement writer for the Central Electric Company has been a source of interest to readers of electrical journals.

Brooklyn Electric Railways.

The retirement of the Johnson interests in the Nassau trolley line, of Brooklyn, N. Y., was announced last week, and new members of the board of directors were elected in their places who are very friendly to the Brooklyn Heights Railroad Company. It is to be presumed that a consolidation of these two vast interests will soon be effected. This will place President C. L. Rossiter, of the Brooklyn company, at the head of the greatest electric railway system in the world, and it is the honest belief of the ELECTRICAL REVIEW that the patrons of this vast surface transportation organization are to be congratulated over this fact.

Wall Street and the Electrical Stock Market.

No previous week in Wall Street's history ever approached the total business transacted on the New York Stock Exchange during the six days ended Saturday, January 14. There has been an average of over 1,000,000 shares of stock traded in daily.

To-day was the most remarkable Saturday Wall Street has ever known. In the short two-hour session transactions in stocks went far beyond the average total of ordinary five-hour days, and with the remarkable activity there was a buoyancy of a sensational sort. Transactions in stock aggregated almost 700,000 shares. It was a fitting wind-up to the greatest week in Wall Street history.

Mr. George S. Hickok, of the National Park Bank, an experienced and conservative New York financier, expressed himself as follows on the money situation: "There is plenty of money in this country and plenty more coming, enough, I believe, to meet the demands of any increase in business that is likely to occur. The present prosperous conditions seem certain of continuing. Confidence has been restored, and that always makes money cheap. With the favorable outlook for trade and with no fear of political disturbances, there seems no reason to fear that money rates will be advanced this Spring."

There was considerable activity in Electric Vehicle stock (unlisted). The common came into the market at 18 on Wednesday and closed at 28 on Saturday. The fine earnings of the 85 electric carriages in use in New York and the demand in other cities for the service are said to be the cause of the advance. General Electric and Westinghouse were both firm, the latter advancing a few points in Boston. General Electric closed to-day at 100¼; Westinghouse, 44¾; American Bell, 295, a gain of 1½; Erie Telephone, 94. Electric Storage Battery (Philadelphia) advanced 1 point to 61½. Union Traction (Philadelphia) is attracting some favorable attention on Wall Street, and is firm around 33⅝.

Wall Street, January 14, 1899.

THE EDUCATION OF ELECTRICAL APPRENTICES AND JOURNEYMEN.

READ REFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, DECEMBER 28, ~~1898~~ 1893, BY ARTHUR A. HAMERSCHLAG.

I am leaving, to a certain extent, the beaten path of precedent by giving the institute a lecture on a subject which is neither pure science nor engineering. It is because of the importance of the subject, and the influence it will exert on the future of the electrical industry, that I have been bold enough to broach it. I do so with the hope that some agitation and discussion will point out a solution of a problem which becomes of more vital importance each year—that of securing the necessary skilled mechanics requisite to the execution of electrical engineering works in a satisfactory and efficient manner.

The world has watched, with startled eyes, the rapid and forereaching strides the young electrical industry has made, and the numerous fields in which electricity has entered. Scarcely a decade has passed since the industry, with justice, was called an infant. From a total investment of a few thousand dollars, it has today grown to such proportions that it would be impossible to compute with accuracy the value of the various industries in which electricity plays a prominent part. It is almost as difficult to assimulate the figures of value in their proper proportion, as it is to define the widening field they have developed for skilled electrical labor. From an industry that gave employment to a few hundred men, in a decade it has expanded, until to-day it demands the services of tens of thousands of men, devoting their services exclusively to this work.

It has also demanded men of intelligence, of a comparatively high order, well equipped with mechanical skill. That we have made such astonishing progress is remarkable, but not nearly so wonderful as that we have found in the past men sufficiently large in number, capable of developing, manufacturing and devising electrical products on a marketable basis.

Should another generation find a proportional increase in the demands for electrical products and operations (and the prospects are good for such an increase), shall we be equally fortunate in finding the skilled men necessary? Is it just as certain these men will be found?

It is the doubt that this latter condition will not be so easily mastered that has given me the courage to speak to you to night on this subject.

The birth of an industry is not the most potent factor in determining its development; it needs the nourishment and care of those engaged in it to make it grow to maturity. With its growth it must develop and mature the individuals upon whom it most depends. Merit alone will not enable it to be perpetuated and put upon a successful basis which means success unless it is capable of placing its raw material in the hands of skilled workers upon whom absolute dependence can be placed.

It is to accomplish this most essential factor of future success that I believe it time that we give a thought to meeting the coming demand by educating the apprentices and journeymen to that point which will make it possible for our boldest conceptions in electro-technics to be skillfully and economically solved.

As we draw near to the closing days of the century, a hundred years pregnant with progress and events, none is more notable in the world of science than electrical achievements. A thought and a backward glance will show American supremacy in this field. In order, however, to retain this supremacy we can not afford to rest content with the laurels we have won, else they will be wrested from us.

The old world has given us excellent mechanics through its apprenticeship system; unfortunately even in those countries that system is dying out. This country has never had a well developed apprenticeship system, and to day it has almost entirely disappeared because of the peculiar restrictions placed thereon by the unions and associations, and the centralization of the work under single financial heads, paying men by the hour or day, and whose employés shift from place to place as the demand for their services varies from busy to dull times. In fact, to-day the apprenticeship system is almost impossible for financial and other reasons, so we must devise some other means of educating the youth who wishes to enter the electrical field.

It is true that three or four of the largest electrical concerns do apprentice young men, but the number is comparatively small, and it requires considerable influence to secure such indentures. The number of applicants is, however, out of all proportion to the number that can be accommodated, and such openings are almost entirely out of the reach of the vast majority because of isolated locations.

Electrical work as a trade and as a profession is now undergoing the same trials and tribulations regarding the educational means that other trades and professions have undergone in the past, except that the problem in the electrical industry, owing to its rapid growth, is of vastly greater urgency. Because of this growth along scientific and mechanical lines improvements succeed improvements so rapidly that what was considered good practice yesterday becomes obsolete and defective to-morrow. The men or mechanics who but a few years ago handled cleats and mouldings in wiring, are to-day asked to use iron pipe and conduit, requiring totally different tools, materials and methods. And where do these men acquire the efficiency and facility for this work? They acquire it in the crudest and most uneconomical method possible, by experimently using their employers material and at his expense, in the time during which he is compelled to pay for skilled labor. These improvements certainly result in the loss of journeymen's efficiency, and result in "rule of thumb" mechanics.

This type of mechanic is to be found in all trades, and sometimes he is exceptionally skilled in his work and thus causes a tendency on the part of the employers to desire more men like him, especially when he is placed side by side with the so-called theoretical mechanic who lacks the skill.

The fallacy of this reasoning is at once apparent when the "rule of thumb" mechanic comes in competition with the well grounded and educated mechanic who possesses an equal amount of skill. Then the efficiency of the latter is so much greater that there can be no comparison.

Oftentimes we meet men with such a vast preponderance of theoretical training that it has removed the inherent practical skill, and this type of journeyman is almost useless when judged from the working standpoint. This latter condition is not a rare one by any means, and just a few words concerning it may be appropriate.

A glance over a list of our numerous educational institutions causes us to feel proud of our achievements in this line. In almost every settlement or city throughout the country some school, college or university is supported upon as lavish a scale as one could desire. Endless seem the opportunities which the young American has to acquire the learning and higher education which are prized and cherished in the world to-day. We have schools for every conceivable purpose, we have colleges and universities for every profession, and we have technical institutions almost unmatched in efficiency, but we have only a very few practical trade schools, and for the education of electrical mechanics fewer still. And yet in which field can we utilize, at present and in the future, the greatest number of skilled men; in the engineering branch or in the skilled labor branch? The answer must obviously be in the latter. Still parents will persist in sending their children, regardless of their inherent qualities, to the colleges and universities to master a profession, without giving a thought to the field in which their future labors must be conducted, without considering the compensation they will receive. And what is the result? There can be only one general reply.

After years of study and much money spent in acquiring the profession and an early association with children of wealth and refinement, the born mechanic becomes ruined for the sake of experimenting for a genius or a great engineer. The field for mediocre engineers is just as narrow and confined as it is for the mediocre artist; the compensation for his labor is equally curtailed, and, as a result, when the young man is thrown on his own resources he must suffer that genteel poverty which his training in refined circles has bound him to. He can no longer look with pride at the work of his hands, and his brain power being but the average he suffers acutely, and eventually becomes neither an excellent mechanic nor an excellent engineer.

Each year the colleges and universities are sending into the world large numbers of young men, who after years of work take the title of "electrical engineer." How many of these will ever have an opportunity to do any genuine electrical engineering? How many of them are destined never to earn, in the electrical line, $1,000 or so a year, the pay of a skilled mechanic?

For every single opening for an electrical engineer there are 100 openings for the skilled journeyman, and for every successful engineer there are 100 successful journeymen.

And to be a journeyman does not mean to be debarred from engineering.

Who have made the notable inventions, who have carried out the greatest engineering problems? Not the trained engineer, but the journeymen who have started at the bottom and by their individual efforts raised themselves to the highest level. "By their deeds ye shall judge them," is true of men, whether they have been educated up to a high standard or not, and self-training is often the more effective.

The compensation for skilled electrical labor, such as journeymen bring into the market, has been on the increase; it will continue to increase, and in an unfair degree, unless those who are the employers do not think in time of a method of supplying the increasing demand or of making the labor which is offered worth the increase in results achieved.

Every new electrical equipment, each railroad equipped electrically and each industry which depends on electricity is taking some of our skilled men from the open market and retaining them permanently and confining their energy to maintaining such equipment.

Whence will come the men to replace these defections. Has no one a solution to offer as to the best way of replenishing the supply?

Many methods of solving this problem have been tried, some of them without proper consideration of the case.

Some have been the education of journeymen in other trades, such as carpenters, draughtsmen, etc., by means of actual experience during their employer's time—a poor means at best, and which places the burden directly on the shoulders of the employers, while the resulting mechanic leaves much to be desired in all-around efficiency.

Oftentimes young men imbued with the desire to be electrical artisans attend, in a desultory fashion, popular lecture courses, witness a few experiments in static and galvanic electricity and find them of such interest that, even though they posses little or no qualifications, and have been educated and trained for other lines, they determine to make electricity

their life-work. Their method of securing the necessary instruction is usually a so-called apprenticeship in a shop manufacturing some article, which in itself gives them comparatively little instruction, and which makes them eventually skilled in head work without giving them any breadth of training, and merely enables them to fill the position of a slim automatic machine.

Sometimes they read electrical lectures and trade papers, in many instances finding themselves very much at sea because of the technical character of the papers and articles which their previous training has done nothing to enable them to understand.

Sometimes, as a final resort, they become recipients of the training offered by correspondence schools, and these schools are certainly gathering an ever-increasing clientele which their merit justifies.

In very rare instances they attend by far the best and most modern form of securing this training, and that through the trade school. There are, however, such a very few of the latter institutions, in spite of their acknowledged merit, and they are so little known, that only a very small percentage of the number who wish to become electrical craftsmen can reap their benefits.

The superiority of the trade school for educating and equipping young men for trade work is so vastly superior to any other form of acquiring the result that to it in the future must we look to solve this very serious problem. Foreign countries have realized this fact for many years, and profited by it. Is it not time that this progressive country began to realize it also, and to stimulate and support such institutions? They certainly are bound to spring into existence, and those that exist and have an honorable record are bound to improve that record, and it is but a question of time when intelligent thinkers must give them their proper place and dues.

It has been my good fortune to have been connected with trade schools for some years, notably with the New York Trade School, St. George's Evening Trade School, of New York, and the Highland Falls Trade School, of Highland Falls, N. Y. They have taught me a lesson which I hope to profit by in the future, not alone concerning the electrical industry, but concerning many trades. It is a lesson, however, which applies in an equal measure to them all. And it is that trade schools have an equally high aim and purpose as that of any educational institution in the country. That the field which they cover can not be covered in any other way, and if they were accorded the same support and encouragement by the fraternity and public that other educational institutions receive their effect and beneficent influence would be as widespread, if not felt in even a greater degree, because of the class which they aim to assist.

It seems strange to me that trade schools should be subject to such marked indifference by the employers and by such intense persecution and criticism by the fraternity which they aim to assist, merely because of the possible future competition its then graduates will cause when they have come to the journeymen's estate.

Was there ever a scientific institution aiming at higher education—a medical college, a law or an art school—but received the support and indorsement of the leaders of the respective professions, if its object was not to make money but to benefit the respective branches?

Are the prominent lawyers, physicians, artists or the men of any other profession less free from the thought of future competition than the journeymen and the employer that the latter should be found wanting in that which tends to advance their profession?

The governing societies—the trade associations, the employers' associations—must see the wisdom of the trade schools eventually, and when they will realize the necessity for them, and be compelled to support them, then, indeed, will they see the error of their ways.

A society like the American Institute of Electrical Engineers, whose members comprise a very large number of the engineers engaged in electrical enterprises, can do much to bring this problem before the men of their line, and can materially assist in a solution of this problem, of so much importance to the welfare of the electrical industry. The youth of the country, imbued with the desire to become electricians, will force their way in, and the inevitable is bound to occur. These young men will eventually enter the field of their choice. Why not help them and encourage them to enter under the best conditions and highest possible standard, instead of leaving them to drift in, unequipped, inefficient and lacking in essential requirements? Is it not best for them to live up to the studies exacted of skilled artisans in other lines, so that they can not only become self-reliant and successful, but reflect credit on the fraternity to which they have given their allegiance?

Trade schools have in the past done much to assist young men to acquire the rudiments of trades in other lines, they have tended to raise the standard of the individuals styling themselves helpers and journeymen by determining the capacity of the beginner and they have put the highest premium on skill and efficiency.

What I wish to impress most seriously on my hearers, is that this question of educating apprentices and journeymen bears a vital and urgent relation to the future success or failure of an industry in which we all feel commendable pride.

The New York Trade School, owing to the far-sightedness and philanthropy of its founder, Col. Tylden Auchmuty, has been in the field to remedy this coming death of skilled mechanics, and the crowding out of our home industries of the native-born American workers by foreign skilled labor. Aided by the munificence of Mr. J. Pierpont Morgan and other gentlemen, it has been able to broaden its scope, until to-day it ranks as the pioneer and largest trade school in the country. With its 6,000 graduates it has demonstrated its utility and shown the way to those who wish to follow.

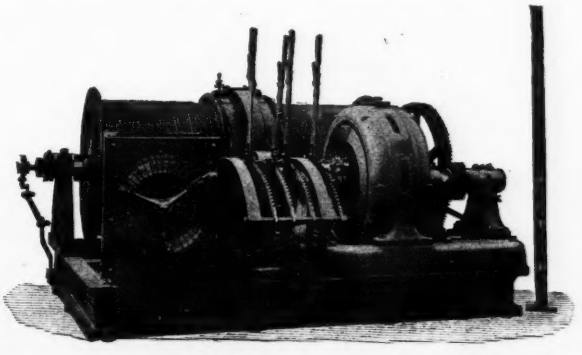
Three years ago it took cognizance of the electrical situation and immediately inaugurated a thoroughly practical course for electrical workers, which became at once an assured success, filling the classroom to its fullest capacity and having a waiting list of young men eager to enter the classes.

The first year the class numbered 32. The second year a larger department was inaugurated and 50 were accommodated, and still the waiting list continued to be as large. This year 50 are again at work and fully that number were turned away.

The course is thoroughly practical, because nothing is taught which is not done by the students themselves and tested and proved before acceptance. I have appended a list of the various operations taught which will show how broad and effective the course is.

This year a course for journeymen workers in the form of practical lessons will be inaugurated. Its success is problematical, but should it show any signs of growth and interest it may lead to future results which can not fail to be of interest to the whole electrical fraternity.

The lantern slides show the classes at work and a few samples of work, but give a vague impression of the school, which all members of the institute are cordially invited to visit.



ELECTRIC MOTOR AND DRUM HOIST.

Double Drum Hoist and Electric Motor.

The electric hoist illustrated shows one of the recent applications of a General Electric induction motor to a double independent drum Lidgerwood mine hoist. It is compact in form and the levers controlling the clutches and brakes and handle of rheostat are placed in the position most convenient for control by the operator standing on a platform above the floor and having a clear view over the top of the hoist.

Each friction drum is driven through a single reduction gearing by a 100-volt 12-pole induction motor of 30 horse-power capacity, running at 600 revolutions per minute. Each drum is independent and is 42 inches in diameter by 40 inches face. Together they hold about 420 feet of seven-eighths-inch rope. The maximum hoisting speed is 300 feet per minute and the weight hoisted, i. e., load car and cage, 2,100 pounds. The depth from which the load is to be hoisted is 400 feet from the surface.

The "Electrical Review" a Veteran of the Late War.

TO THE EDITOR OF ELECTRICAL REVIEW:

It is more than a year now since I began to receive the ELECTRICAL REVIEW, and I want to thank you for the great pleasure and benefit which I have derived from it during that time. Of the many articles that I have reproduced from its columns, for the benefit of the English class of engineers at the —— —— University, not one has been uninteresting.

When the war broke out I went with my battery into camp and you may take some pleasure in the fact that the ELECTRICAL REVIEW is now a veteran, having gone through the war with me. I think there are very few scientific papers that can claim the same.

I wish to congratulate you upon the clean, well gotten-up ELECTRICAL REVIEW, and the character of the cuts and engravings are above comment. In fact, I know of no scientific paper which is so interesting, not only to the student of electrical studies, but to the average reader.

Wishing you a year of success and prosperity, I beg to remain,

Very truly yours, R. B. B.

Columbus, Ohio, January 9, 1899.

The Union Traction Company, headed by Congressman Henry, has purchased the Elwood, Ind., Electric Street Railway plant.

Operation and Construction of Fuel Economizer Apparatus.

The high degree of economy of operation which is being attained in electric power plants is making the subject of fuel economizers for boilers one of much discussion. The specific form which we are illustrating and describing here is known as Green's economizer, which is said to be in use in something like 150,000 boilers. A

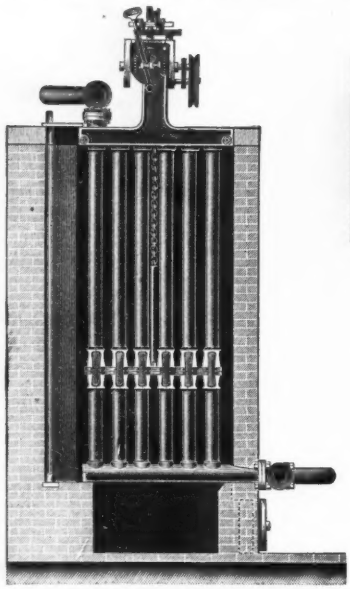


FIG. 1—CROSS-SECTION CHAMBER THROUGH ECONOMIZER.

description of the apparatus may be of interest just now to many who are not perfectly familiar with the principle of operation.

The apparatus, in the main, consists of a stack of tubes arranged vertically in the flue leading from the boiler to the chimney, and designed to utilize the waste heat in the gases passing off from the furnace. This is accomplished by absorbing the low temperature heat of the gases in heating the feed-water, which is pumped through the economizers in the first instance, before its entry to the boiler.

It is this fundamental principle of heating the feed-water in a separate vessel quite apart from the boiler, and thereby utilizing the waste gases passing to the chimney, which is claimed to constitute the distinctive feature of the first of Mr. Edward Green's invention — an invention which, in its influence on boiler economy and design, is analogous, many think, to Watt's application of the separate condenser to the steam engine.

It is a recognized fact that the most economical boilers are those which have the most rapid circulation and when it attains this circulation, the temperature of the escaping gas must leave the boiler considerably above the temperature of the steam. What its ratio should be to obtain the highest economical results is a subject on which engineers differ very widely. With the high pressure now in use, gradual in increase, the temperature of the gases increases in proportion to the temperature of the steam generated, and so the application of economizers is in this connection by many recommended.

The construction of this apparatus, manufactured by the Fuel Economizer Company, Matteawan, N. Y., consists of a series of sets of cast-iron tubes about four inches in diameter and nine feet in length, made in sections (of various widths) and connected by "top" and "bottom headers," these again being coupled by "top" and "bottom branch pipes" running lengthwise, one at the top and the other at the bottom, on opposite sides and outside the brick chamber which encloses the apparatus. The waste gases are led to the economizer by the ordinary flue from the boilers to the chimney.

The feed-water is forced into the economizer by the boiler pump or injector, at the lower branch pipe nearest the point of exit of gases, and emerges from the economizer at the upper branch pipe nearest the point where the gases enter.

Each tube is provided with a geared scraper, which travels continuously up and down the tubes at a slow rate of speed, the object being to keep the external surface clean and free from soot, a non-conductor of heat.

The mechanism for working the scrapers is placed on the top of the economizer, outside the chamber, and the motive power is supplied either by a belt from some convenient shaft or small independent engine or motor. The power required for operating the gearing, however, is very small.

The apparatus is fitted with blow-off and safety valves, and a space is provided at the bottom of the chamber for the collection of the soot, which is removed by the scrapers.

And so it will be seen that this branch of steam development has had much study and attention by those who follow carefully the mechanical and engineering construction of this character of apparatus.

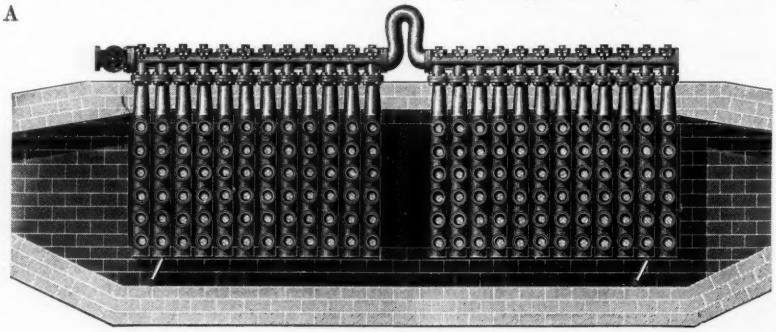


FIG. 2.—PLAN OF ECONOMIZER CHAMBER, SHOWING PASSAGE FOR INSPECTION.

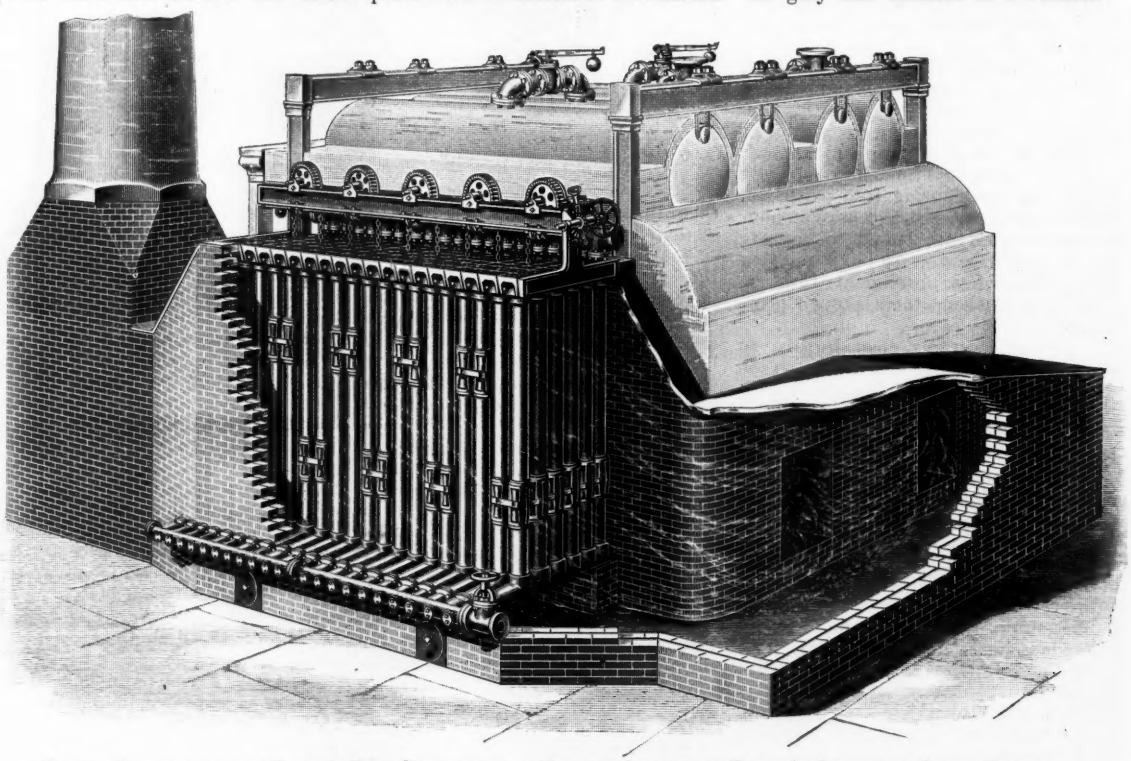


FIG. 3.—CONSTRUCTION OF GREEN'S FUEL ECONOMIZER AS USUALLY APPLIED TO ELECTRIC LIGHT AND POWER PLANTS.

Calendars and Advertising Novelties.

James L. Norris, solicitor of patents, Norris Building, Washington, D. C., is distributing a neat wall calendar of small and convenient size.

The Phillips Insulated Wire Company, of Pawtucket, R. I., has prepared a handsome calendar printed in two colors. The design is an effective one, and the company's well known trade-mark, "O K," is prominently displayed.

F. A. Ringler & Company, photo-engravers and electrotypers, send to the ELECTRICAL REVIEW a remarkably handsome calendar. There is, above the dates, a beautiful reproduction from an oil painting, printed from relief plates and, as announced, by the new three-color process. No more attractive calendar has been received.

The handsomest calendar received by the ELECTRICAL REVIEW during the present season is that just issued by the Sprague Electric Company, 20 Broad street, New York city. It consists of a handsome engraving in mezzo-tint, below which is suspended a monthly calendar pad, the whole being surrounded by a silver gray mat enclosed in a Flemish oak frame. The effect of the calendar as a whole is beautiful. Whoever evolved the idea is entitled to congratulations. The Sprague Electric Company is also sending to its friends a little vest-pocket reminder, which no doubt will be highly appreciated.

Telephone News .....and Comment

The Boston News Bureau, in an interesting article on the recent telephone consolidation, says that it is expected that Erie stock will soon go to 100. It says: "Nobody can say when it is going there, but certain it is that the Erie Telephone Company, by the absorption of the Michigan Telephone Company, becomes the largest operating telephone company in the United States. The four leading companies, however, are so near together that there will probably be a great race the next few years for the head of the list in the number of telephone subscribers. It seems a bit singular the New England Telephone Company, the home of the telephone, should rank fourth with 40,000 subscribers, while the Pacific Coast Company has 45,000 subscribers. The Erie system with its present 50,000 subscribers, including Michigan, will probably be raced very strongly by the Pacific Coast Company. The Erie system, including Michigan, gained 10,000, and the Pacific Coast Company, 10,500 last year. General Sabin, of the Pacific Coast Company, has hung a card in his office as the motto and aim of the company: 'Pacific Coast states, 100,000 subscribers.' In 1895 General Sabin was presented with a diamond pin to mark the epoch of 10,000 subscribers in San Francisco, which was twice the number that had been considered the limit a few years previously."

Improvement in Telephone Apparatus.

In line with the recent developments of modern telephone apparatus it will interest the telephone readers of the ELECTRICAL REVIEW to have presented a description of telephone instruments and the elements for telephone apparatus of the "Victor" types. Until recently the name "Victor" has mostly been associated with telephone switchboard apparatus, as the Victor Telephone Manufacturing Company of Chicago, the makers of this apparatus, have gained repute by their developments along the lines of switchboard construction. This title, however, now covers a complete line of instruments of all characters and also many important and new features in this class of construction.

The transmitter, illustration Fig. 1, used in the "Victor" apparatus has not before been illustrated. Its principle of construction embodies the latest scientific ideas of the microphone. The shell is made of solid cast brass, accurately turned and fitted so as to make it absolutely moisture proof. The diaphragm is metal, with a burnished gold electrode, and of the proper diameter for natural articulation. One important feature in this transmitter is that it may be quickly removed without disturbing the inside mechanism or the disconnection of any wire.

FIG. 1.—"VICTOR" TYPE OF TRANSMITTER.

The magneto bell, illustration Fig. 2, which is used with this apparatus has several radical features. The back of the cabinet is routed so as to permit the running of the wires in a laced system, which is believed to be proof against disarrangement and the trouble so often occasioned by loose and exposed wires. The contact switch is constructed of a heavy German silver spring with sharp rubbing contacts, designed to insure perfect connection at all times.

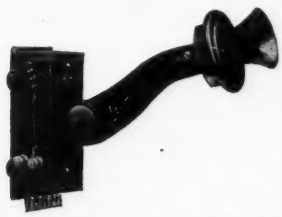


FIG. 3.—RECENTLY DESIGNED "VICTOR" HOLLOW ARM TRANSMITTER.

The new hollow arm transmitter is a recent design from the "Victor" shops. Its general principles are shown in Fig. 3. The desirability of this character of an arm transmitter is appreciated by telephone experts, as it eliminates the possibility of a breakage of the transmitter cords, which has been a seemingly insurmountable difficulty in the application of the adjustable arm to the various types of instruments.

Illustration Fig. 4 represents an instrument that has been designed to fill all the requirements of a portable telephone set. As with all the other "Victor" apparatus, the greatest care has been taken to combine artistic design with the highest possible mechanical and electrical efficiency. This instrument consists of a substantial black-enameled metal base, containing a 500-ohm silk induction coil, switch springs, cord connections, etc., and surmounted by a nickel-plated column which supports the receiver and transmitter head. This set is supplied with a regular pony or bell-flare, double-pole receiver, as may be desired.

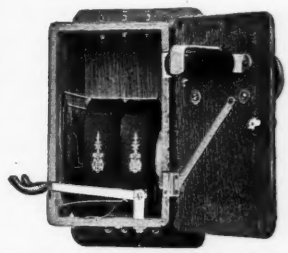
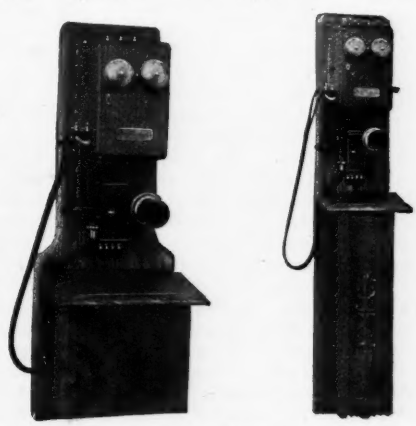


FIG. 2.—"VICTOR" MAGNETO, SHOWING INTERIOR CONSTRUCTION.

The receivers used in connection with the "Victor" apparatus are of the bipolar type, and are made with the magnet cores inserted in horseshoe magnets, so as to allow further contraction and expansion without affecting the adjustment of the diaphragm.

FIG. 4.—"VICTOR" PORTABLE SET.



FIGS. 5 AND 6.—STANDARD TYPES OF "VICTOR" EXCHANGE INSTRUMENTS.

The illustrations Figs. 5 and 6 show two of the standard "Victor" types of instruments.

MANUFACTURING NOTES.

The Ferracute Machine Company, of Bridgeton, N. J., is sending out a special sheet circular illustrating and describing a large number of foot and power presses. The company has made a special reduction in prices, and has several new styles of presses.

The Western Electric Company, of Chicago and New York, has recently issued Bulletin No. 12 T. B. L., descriptive of a tile bolt and lock, and also a screw bracket. The two devices are much in demand. If any of the readers of our paper have not received a copy of this bulletin, one will be mailed to them upon application.

The Manhattan General Construction Company, 11 Broadway, New York, announce in this issue that they have 200 "Manhattan" direct current, five-ampere arc lamps, and 50 "Manhattan Junior" three-ampere lamps for sale at very low prices. This company is now introducing the new types of "Manhattan" direct and alternating-current lamps, which embody the most advanced principles of arc lamp construction.

The Cutler-Hammer Manufacturing Company, of Chicago, have greatly increased their manufacturing facilities, and now announce that they believe they have the best equipped factory devoted exclusively to the manufacture of rheostats in the world. These facilities, with their large volume of business, have enabled them to reduce the price on rheostats to the trade, and all interested are requested to write for the new quotations. The company's works are at 70–82 West Jackson boulevard, Chicago.

The Farr Telephone and Construction Supply Company, of 357 Dearborn street, Chicago, Ill., are working their force night and day, and it is impossible to keep up with their orders which are coming in from all parts of the United States and Canada. Mr. Farr says that the independent telephone companies have found a telephone supply house which furnishes them everything in that line, from the best to the cheapest. The company has worked up an enormous trade within the last three years, which speaks very well for the energetic management.

As an indication of the appreciation with which the trade regards the twentieth century catalogue issued by the Central Electric Company, who are daily in receipt of testimonials, the following are regarded by the Central Electric Company as compensatory: "We hereby acknowledge the receipt of your grand general catalogue and discount sheet. Please accept our thanks for same, and when in need of any material will send in our order, and we beg to acknowledge receipt of the copy of your new catalogue, and wish to compliment you on this very elegant publication. It is a credit to your firm, and we hope will be the means of largely increasing your business. It certainly will prove of great value to all purchasers of electrical supplies, as it seems to be nearer perfect than anything in this line heretofore published."

SOME NOTES ON THE RECOVERY AND REFINING OF NICKEL.

BY SHERARD COWPER-COLES IN THE LONDON "ELECTRICAL REVIEW."

Every year nickel is taking a more prominent position in the industrial world, and electrical methods are being applied both to the winning, refining and electro-deposition of nickel on a large scale. Nickel, holding a position in the metallurgical world between copper and iron, can be won by methods analogous with those employed for both metals. It combines readily with the metalloids, with sulphur and arsenic, which play a prominent part in the metallurgy of this metal. All the important nickel compounds met with industrially are derived from the protoxide NiO, the peroxide being a very unstable salt. The sulphide ore can be run into a matte or regulus, and the oxides directly reduced to crude metal; also the arsenside (speise), which are subjected to either dry or wet treatment, mainly with a view to separate the associated carbon.

The Burton forge is said to have been applied to the treatment of nickel ore in Canada. The oxide is enclosed in a cradle and submitted to the combined action of the arc and of hydrogen by immersion as the positive electrode in a current of great intensity in a suitable electrolyte. The possibility of depositing nickel electrolytically appears to have been first contemplated in the year 1840, when an English patent was filed covering the use of the double cyanide of nickel and potassium as an electrolyte. This process has been of no service in the electro-metallurgical extraction of nickel. R. Böttger has succeeded in obtaining good deposits from the double sulphates of nickel and ammonia, and this process is the one which is now almost entirely used for the electro-deposition of nickel. Mineral acids, if in the free condition, are found to be detrimental; boric and phosphoric acids, however, appear to be harmless; of basic solutions only those which are ammoniacal can be used. Borcher recommends the use of sulphonic acid as a depolarizing agent.

Dr. Ludwig Mond's process is an entirely new department in metallurgical practice, and is based on the simple property possessed by nickel of forming a volatile compound with carbon monoxide, metallic nickel being released when the compound is heated to 180 degrees centigrade. Dr. Ludwig Mond, in collaboration with Dr. Carl Langer, has discovered a method of eliminating the carbon monoxide from gases containing hydrogen. They were guided by the observation that finely divided nickel removed carbon from carbon monoxide at a temperature of 350 degrees centigrade, converting it into carbon dioxide, whereas the dissociation of carbon monoxide by heat alone, according to Victor Meyer and Carl Langer, remained incomplete at a temperature of 1,690 degrees centigrade. In the original experiments carried on in connection with Dr. Friedrich Quincke, finely divided nickel was formed by reducing nickel oxide at 350 degrees centigrade, by hydrogen treated with pure carbon monoxide in a glass tube at varying temperatures. The gas escaping from the apparatus was ignited, and while the tube containing nickel was cooling, the flame became luminous and increased in luminosity as the temperature sank below 100 degrees centigrade. Metallic spots were deposited on a cold plate of porcelain, held in this luminous flame, and on heating the tube through which the gas was escaping a metallic mirror was obtained, while the luminosity of the flame disappeared. These metallic deposits were found to be pure nickel. Nickel carbonyl was then isolated in a liquid state, and it was possible to produce it with facility in any desired quantity. No other metals which were submitted to investigation showed indications of combining with carbon monoxide except iron. The result of these discoveries was that in 1892 an experimental plant on a large scale was erected at Smethwick, near Birmingham.

F. Föerster is among the foremost who have applied electro-metallurgical methods to the winning of nickel. He has carried out a number of valuable investigations to determine the cause why nickel deposits are inclined to peel. It does not appear to be due to oxygen; electrolytic cobalt contains oxygen, but the deposition does not offer any great difficulty. The best results were obtained from hot neutral sulphate solutions, but the percentage of iron and cobalt was hardly altered, so, for refining purposes, this electrolyte is unsuitable. Carbon, silicon and copper did not contaminate the deposited nickel. Nickel chloride solutions were found to be troublesome, hot neutral solutions formed basic chlorides; but this difficulty was overcome by adding hydrochloric acid, but then hydrogen was given off at the cathode, which interfered with the deposit.

In André's process, copper or carbon plates are used as cathodes, and nickel matte, speise or impure nickel, cobalt and copper compounds are used as the anodes. The copper is deposited on the cathode; nickel is not deposited as long as the electrolyte is acid. In order to separate every trace of copper from the solution, a carbon plate is substituted towards the end of the operation for the matte of alloy anode. A small quantity of ammonia is then added to the solution, air is passed through while it is being evaporated in leaden pans, the iron is separated as a flocculent hydroxide, and is removed either by filtration or by sedimentation. Pure nickel sulphate can then be obtained from the solution by concentration. The nickel sulphate solution, after being made ammoniacal, is then electrolyzed with porous diaphragms. The anodes are composed of iron or zinc, as these are found not to polarize; two diaphragms are used; the solution between the two diaphragms is periodically drawn off to prevent the iron or zinc sulphate solution formed at the anode mixing with the nickel catholyte.

Farmer patented a process in 1888 for the production of nickel-plate, the apparatus consisting of rollers made of a non-conducting substance, which were caused to maintain open hollow brass or copper cylinders in continuous slow rotation, which served as the cathodes. Nickel-plates were bent into half cylinders and used as anodes, placed beneath the lower half of the revolving cylinders. Arms fitted with rollers were caused to press against the cylinder and formed the negative contact. The solution recommended by the inventor is composed of the double sulphate of nitrate of nickel and ammonia.

Hoepfner has patented a process for using a purified neutral solution of nickel which he then acidifies with a weak and freely conductant oxygen acid (citric or phosphoric acid), which is electrolyzed with the aid of insoluble anodes.

The anodes are immersed in cells containing a solution of the chlorides of a more electro positive metal, which may be partly or wholly soluble in the solution, but in that case some metal, such as zinc, which would not be deposited with the nickel, must be used.

In the commercial electrolysis of nickel, even with anodes containing as high as 96 per cent of nickel, the anodes readily fall to pieces, owing to their uneven solution. A large quantity of anode scrap is formed, often as much as 50 per cent; this difficulty increases when matte anodes are used.

Askermann has tried fusing chromium oxide and antimony sulphide, Below the fused crust of sulphides which is formed a crystalline mass of the two metals occurs, the antimony being finally removed by oxidation or refusion. The addition of sulphides is considered to accelerate and facilitate the metallurgical reactions.

Neumann has given attention to electrolytic methods for determining nickel, which have been employed to some extent in practical analysis; viz.:

1. Sulphate of ammonia in excess.
2. Electrolysis after converting the solution into ammonium oxilate.
3. Electrolysis of neutral nickel solution after decomposition with ammonium carbonate.

Of these methods the first is most frequently used, any iron being first precipitated with ammonia and the filtrate electrolyzed, which is not possible in the case of the oxalate method.

Neumann has used electrolytic methods with considerable success for the determination of nickel in steel and for nickel slags.

Classen has proposed a method of depositing the nickel and iron simultaneously; dissolving the deposit in dilute acid and determining the iron volumetrically is a slow one.

A new iron alloy has been invented by Dr. Charles Gillaume that has an expansion under a rise of temperature smaller than all other alloys produced so far. The alloy consists of 36 parts of nickel and 64 parts of iron.

Seven to 10 per cent of nickel added to aluminum forms an excellent alloy when brightness combined with hardness is desired.

The magnetic properties of nickel are interesting; numerous researches have been made on this subject. Dumont has determined the magnetic permeability for fields lying between 14 and 50 C. G. S. units, and for temperatures between —78 degrees and 250 degrees centigrade, of reversible nickel steels, containing from 27 to 44 per cent of nickel The variations of permeability with temperature in the maximum field are continuous, and the curves representing them are roughly parallel to each other, so that at equal distances (of temperature) from the point of total loss of magnetism all the alloys have the same permeability. At a temperature of 20 degrees all the alloys show similar changes of permeability, with variations in the magnetizing field, rising slowly as the field is strengthened from 14 to 25 units, then rapidly increasing to a maximum in a field of 35 units and slowly diminishing as the strength of the field is further increased. Under the same circumstances of temperature and strength of field the permeability increases with the content of nickel.

Fine nickel is produced electrolytically at Newark, N. J., in plates three-eighths of an inch thick; the Canadian Copper Company have also erected a large experimental electrolytic plant at Cleveland for the treatment of Bessemer nickel matte. Messrs. Gustave Menne & Company, of Siegan, are also supplying electrolytic nickel.

LITERARY.

The twentieth annual number of *The Tradesman*, of Chattanooga, Tenn., has been issued. It is worthy of preservation as a reference book, and its contents evidence careful preparation.

"The Foundations of Zoology," by William Keith Brooks, professor of zoology in Johns Hopkins University, will be published by the MacMillan company immediately for the Columbia University Press. It is the fifth volume of the Columbia University biological series, which is edited by Henry Fairfield Osborne and Edmund B. Wilson.

Governor Roosevelt, in his second article in the February *Scribner's*, says, "It was Dr. Church who first gave me an idea of Bucky O'Neill's versatility, for I happened to hear them discussing Aryan word roots together, and then sliding off into a review of the novels of Balzac." Among the amusing anecdotes told by the Colonel is how the men gave one another nicknames, largely conferred in a spirit of derision; for instance, a fastidious member of a well known eastern club was christened "Tough Ike," and his bunkie, a decidedly rough cow-puncher, was known as "The Dude."

HIGH-VOLTAGE POWER TRANSMISSION.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, OMAHA, JUNE 30, 1898, BY CHAS. F. SCOTT.

(Concluded from page 19.)

"In these notes the term 'Weston wattmeter' is meant to include the field bobbin of the wattmeter and the air transformer used in connection with it.

"After the above wattmeter had been in use for some time, another was obtained for use in the high-tension circuit. It is a Thomson inclined-coil instrument, whose field-coil was rewound for this work. In connection with this wattmeter are two external resistances—the one with a resistance of 1,202.300 ohms, for use in series with the shunt circuit of the wattmeter; the other with a resistance of 3,495 ohms, being equal to that of the wattmeter shunt circuit and intended for use in shunt to the latter, in which case the wattmeter shunt coil receives only one-half of the current in the shunt circuit. When in use the case of the wattmeter was connected to one of the wattmeter shunt terminals, so that the inside and case of the wattmeter were always at the same potential, and the case formed a screen against any external electro-static effects. This wattmeter was of considerable value as furnishing a means of studying the effect of the distortions due to the Weston wattmeter, and also to the readings at low frequency, since in the latter case it was necessary to use both transformers as power transformers, which left nothing for use as a balancing transformer. In the notes this wattmeter is designated as Thomson wattmeter.

"The Ammeters—The ammeters used were two Thomson inclined-coil instruments. They had a capacity of one-half and two and one-half amperes respectively. They were put directly into the high tension circuit, the cases being connected to one terminal of the instrument.

"The Wave Form Apparatus—The method of taking wave forms was that devised and published by the writer, Mr. Mershon, in 1891. It is an instantaneous potentiometer method, employing a telephone receiver to indicate a balance. The connections are those shown in Fig. 19.

"A C is the source of the alternating electro-motive force, whose wave form is to be plotted, S is a double-pole switch for reversing the alternating-current terminals, C is the usual instantaneous contact device, T is a telephone receiver. V M is a direct-current voltmeter—in this case the Weston laboratory standard, R is a resistance along which the contact P can be moved. D C is a source of direct current—in this case a direct-current dynamo feeding the resistance R. The contact C being set at any desired point, the value of the electro-motive force at the instant of contact is determined by moving P backward or forward until there is no sound in the telephone T. The reading of the direct-current voltmeter V M gives the desired value. The electro-motive force alternating current was obtained from the same source as the electro-motive force for the alternating-current voltmeter; i. e., from an auto-converter connected across one-third of the middle coil of the power transformer.

"The Speed Indication—The indication of proper speed, or rather frequency, was obtained from the vibration of a weighted steel wire hung in front of the poles of an alternating electro-magnet energized by the machine supplying power. The wire always vibrated at the frequency for which the suspended weight was adjusted, and ceased to vibrate when there was any appreciable deviation from this frequency."

Appendix B—Calculated charging current to two parallel wires. Length, one mile; 10,000 volts; sine wave.

The charging current to a single-phase line one mile long has been calculated from the formula for capacity between wires and on the assumption that the electro-motive force is a sine wave. The results are given for several cases, and as the variations between the quantities given are not very great, intermediate values can be readily interpolated. The current varies directly as the length of line, the voltage and the frequency.

Size of Wire—B. & S.	No 8	No. 4	No. 1	No. 0000	1" diam.
Distance between centers of wires.	Amperes at 60 cycles.				
12 inches.	.032	.035	.038	.0414	.053
24 "	.0284	.0309	.0328	.0362	.043
48 "	.0252	.0274	.029	.0313	.0369
	Amperes at 25 cycles.				
12 inches.	.0133	.0146	.0158	.0172	.0221
24 "	.0118	.0129	.0137	.0151	.0179
48 "	.0105	.0118	.0121	.0130	.0154

TABLE ILLUSTRATING "HIGH-VOLTAGE POWER TRANSMISSION."

A New Orleans Street Name.

[*From the New Orleans Times-Democrat.*]

"Some of the names of streets here seem to bother visitors a good deal," observed a trolley car starter at the Custom House, "and there's one little experience that I have on an average of about six times a day. A stranger will walk up, generally carrying a bit of memoranda, and say: 'Can you tell me where I will find the—the'— When they get that far along they look sort of wild, like a fellow with a wishbone in his throat, and I know right away what's the matter. 'Certainly,' I reply, 'you will find the Tchoupitoulas street car on the fourth track. Please step to the other side to get on.' As a rule they look relieved, thank me and skip across, but not always. Sometimes they don't believe me and put up an argument. 'Oh, that isn't it at all,' a lady said to me this morning. 'It's a name that begins something like "Tich" or "Tech."' 'To be sure, madame,' I answered, 'but down here we call it "Choppy" for short.' 'How very extraordinary!' she said, and wrote something in a note book."

INDUSTRIAL NOTES.

The Standard Underground Cable Company, of Pittsburgh, Pa., is sending to its customers and friends a neat folding footrule and wire gage, made of celluloid, advertising its well known line of cables and wire for all services.

The Electric Storage Battery Company's business in the New York territory, which is under the efficient management of Mr. Charles Blizard, has grown to such an extent as to necessitate larger office facilities. Additional rooms have been taken adjoining the company's offices in the Commercial Cable Building at 20 Broad street, New York city.

The Babcock & Wilcox Company have taken from Westinghouse, Church, Kerr & Company the largest stationary boiler order that has ever been placed. The boilers are for the power-plant which the Westinghouse Electric and Manufacturing Company have contracted to build for the Third Avenue Railroad Company at 218th street and Harlem River, and which is to be constructed by Westinghouse, Church, Kerr & Company. The order covers 60 Babcock & Wilcox forged-steel type boilers of 520 horse-power each, or an aggregate of 31,200 horse-power. The boilers are to be capable of carrying 200 pounds steam pressure. They will supply steam for compound-condensing engines of 64,000 nominal horse-power in the aggregate.

More than 20 pages of the current catalogue issued by the Western Electrical Supply Company, St. Louis, Mo., are devoted to the subject of telephony. It is a branch of electrical equipment to which this company has given much careful study, and it may be of interest to mention that the organization has on its staff several proficient telephone experts. In presenting the telephone data it is evident that more than ordinary discretion has been exercised in the selection of the details of construction and parts. The apparatus illustrated comprises the "Western" exchange switchboard and toll switchboard, numerous forms of exchange instruments and intercommunicating sets, also the elementary parts, such as bells, receivers, transmitters, induction coils, lightning arresters.

Among the numerous novelties manufactured by William Roche, of 259 Greenwich street, New York city, is a very unique electric necktie pin. The pin is made of brilliants with a small incandescent lamp placed in the center and so arranged that the wires leading to the vest-pocket battery can be concealed beneath the scarf. The connection switch is attached to a separate wire leading to another convenient pocket, and by pressing together the two metal tongues a connection is made lighting the lamp. Considering the size of the lamp the light is a very brilliant one, and as long as the connection is held burns steadily. The battery used in lighting the pin is the new standard No. 4 vest-pocket cell and one of the strongest dry batteries of its size manufactured. Mr. Roche has, during the year he has been manufacturing the new standard dry battery, attained great succe s in the same, and it is now recognized as one of the leading dry cells on the market.

Attention is called to the announcement in this issue of the American School of Correspondence, Boston, Mass. The school offers special advantages to readers of the ELECTRICAL REVIEW to secure an education, enabling them to pass government examinations. The object of the school is to give the busy man a thorough training in steam, electrical and mechanical engineering by mail. The electrical engineering course, which is carefully supervised by electrical experts, is in close touch with the developments in the science. The instruction is carefully graded, thoroughly practical and scientific, and is intended to give to electrical students and engineers a complete technical training. The students' work is carefully inspected by well known experts and instructors of the school, who are all graduates of the leading technical schools. The advisory board is composed of such well known men as Dr. Robert Grimshaw, Mr. Charles Thom, Mr. Francis H. Boyer and others. This school occupies a unique place among specialists, and by having a limited number of subjects to teach is able to secure the services of well known members of the engineering profession for instructors and advisors. The school is chartered by the commonwealth of Massachusetts, and is an educational institution and not a money-making enterprise, and therefore the tuition fee is placed within the reach of all wage-earners. The school has been warmly indorsed by the leading educators and engineers throughout the country. Engineers will do well to write for a hand-book.

ADVANCE INFORMATION

New Incorporations.

DAYTON, OHIO — The Automatic Switchboard Company has been incorporated to manufacture and sell automatic telephone switchboards; authorized capital, $10,000; incorporators, W. M. Bell, C. Whitney, W. M. Weakley, W. L. Blocher, L. C. Walker.

PHILADELPHIA, PA.—The Evans Pneumatic Motor Company has been incorporated to manufacture pneumatic motors and other mechanical or electrical devices; the capital stock is $30,000. The corporators are James R. Cotton, J. Horace Witsil, of Chester, Pa., and S. W. Sparks, of Camden.

CHICAGO, ILL.—The L. B. Allen Company has been incorporated to manufacture electrical apparatus; authorized capital, $2,500; incorporators, J. B. Allen, W. R. Heath, C. C. Carnahan.

MINNEAPOLIS, MINN.—The Gugler Electric Manufacturing Company has been incorporated to manufacture electro-medical apparatus; authorized capital, $20,000; incorporators, J. H. Gugler, S. T. Wiedenbeck, J. J. Heinrich, of this place.

ST. LOUIS, MO.—The Central Telephone and Electric Company has been incorporated, with a capital stock of $10,000, fully paid. The stockholders are James S. Cummings, Charles A. Powers and Paul Reiss. The company will manufacture telephones and appliances.

PORTLAND, ME. — The Bernstein Electric Manufacturing Company has been incorporated to manufacture electrical apparatus; authorized capital, $100,000; paid in, $500; incorporators, A. W. Putnam, Salem, Mass.; E. S. Gardner, Wollaston, Mass.; C. F. Langley, South Boston, Mass.; J. T. Knapp, Roxbury, Mass.; C. H. Tolman, Portland.

NEWARK, N. J.—The C. P. Power Company has been incorporated by Fred W. Yates, Frank W. Roller, George S. Snider, to manufacture electricity, etc.; capital stock, $200,000.

BUFFALO, N. Y.—The New York Electric Machine Company has been incorporated; capital, $10,000; directors, James Tate and Fred Wardell, Buffalo; Thomes E. King, Arbel, Pa.

New Telephone and Telegraph Companies.

FRANKFORT, KY.—The Augusta Telephone Company, with $5,000 capital, has been incorporated; T. S. Bradford, chief incorporator.

SPARTA, TENN.—The Gainsboro Telephone Company has just completed the extension of its line from here to Crossville.

WOODSTOCK, ILL.—The Citizens' Telephone Company has been incorporated; capital, $20,000; incorporators, Marcellus L. Boslyn, John C. Donelly, Daniel F. Curley.

CARBONDALE, PA.—The Carbondale Telephone Company has been incorporated; capital, $5,000; incorporators, J. Moses, M. F. Norton, S. S. Jones, F. Remmelmeyer, F. E. Dennis, W. D. Evans, this place.

ELKIN, N. Y. — The Woodford Telephone Company has been incorporated; capital, $10,000; incorporators, J. F. Woodford, I. C. Woodford, M. B. Woodford, E. Woodford, H. R. Warfield, Philippi; J. M. Woodford.

ASHLAND, OHIO—The Star Telephone Company has been incorporated by George A. Williams, E. J. Grosscup, Samuel A. Grabill, Joseph R. Swartz and George R. Freer, to build and operate a telephone line in 24 counties; capital stock, $50,000.

SPRINGFIELD, OHIO—The Home City Telephone Company has been incorporated by I. Ward Frey, Charles H. Prince, Robert C. Gotwald, Edward C. Gloyn and Robert R. Mills, to build and operate a telephone line in this place and Clark County; capital stock, $75,000.

MCLEANSBORO, ILL. — The McLeansboro Telephone Company has been incorporated; capital stock, $10,000; incorporators, F. M. Stamper, R. A. Youngblood and G. C. Cantrall.

OWENSBORO, KY. — The Green River Telephone and Telegraph Company has been organized to construct a line from this place to Henderson and other points, with ex-Mayor J. H. Hickman as president and treasurer, and H. K. Cole as vice-president and general manager.

LIVINGSTON, WIS.—The Stitzer & Livingston Telephone Company has been incorporated, to do a general telephone business, with a capital of $1,600; incorporators, A. E. Runsdell, Ira W. Griswold and A. V. Wells.

WILSON, N. Y.—The Wilson Telephone Company has been incorporated; capital, $2,000; incorporators, W. N. Harris, A. N. Dwight, G. Wadsworth, J. P. Tenbrook.

Electric Light and Power.

NEW CASTLE, DEL.—A movement is under way in this city to establish an electric lighting plant. The capital stock of the proposed concern will be $15,000.

WILLIAMSPORT, MD.—The Mayor may give information concerning construction of proposed electric light plant and waterworks.

SEDALIA, MO.—W. H. Powell has asked the city for electric lighting franchise.

ATHENS, TENN.—W. R. Hall, of Chattanooga, will install an electric light plant in this city.

HOUSTON, TEX.—The Houston & Texas Central Railroad Company contemplates the establishment of an electric lighting plant.

New Electric Railways.

TOLEDO, OHIO—Another effort is being made to build an electric line from this city to Monroe to connect with the numerous projected lines from Detroit.

CADIZ, OHIO—There is a movement on foot to build an electric road from Uhrichsville to this place.

NEW WILMINGTON, PA. — New Castle capitalists are about to organize a company to build an electric railroad from New Castle to this place, a distance of 12 miles.

EASTON, PA.—The Easton & Nazareth Street Railway Company, capitalized at $60,000, is about to construct a line 10 miles in length. Edward J. Fox, William O. Hay, T. A. H. Hay, Robert Stofflet, of this city, and Charles H. Cox, of Bethlehem, are the incorporators. W. O. Hay is president.

LOGANSPORT, IND.—The Indianapolis & Logansport Traction Company has been organized, with a capital of $100,000, for the purpose of operating an electric railway between the two points named. The incorporators are Dr. M. A. Jordan, of this place; R. C. Light, of Broad Ripple; Horace F. Wood, George J. Marott, A. R. Hovey, J. C. Rucklehaus, William Bosson and L. C. Walker, of Indianapolis.

IONIA, MICH.—The latest railroad project discussed in this place is an electric line from here to Crystal Lake via Palo, Hubbardston and Carson City.

ELECTRIC LIGHT FLASHES.

The Columbus, Ohio, Edison Electric Light Company has increased its capital from $258,000 to $300,000.

The Canandaigua, N. Y., Electric Light Company is now under the management of J. H. Pardee, of Buffalo, who succeeds H. B. Ferguson, of Canandaigua.

Robert Johns, manager and principal owner of the Modern Electric Light Plant, at Pana, Ill., has purchased the franchise and entire equipment of the Consumers' Electric Light Plant for $10,000.

The power-house that supplied the water-power and electric light to the Rock Island, Ill., Arsenal shops has been destroyed by fire, entailing a loss to the government of $10,000. Temporary lighting service has been arranged.

The General Electric Company, of Minneapolis, has filed certificate of incorporation with the County Clerk in Jersey City, N. J. Its paid up capital is placed at $2,100,000. The incorporators are Thomas S. Kingman, of South Orange, N. J., and Daniel S. Platt, of Englewood, N. J., and a number of others. The consolidation of all the electric lighting interests of Minneapolis is intended.

National Electric Light Association and Electrical Exhibition.

TO THE EDITOR OF ELECTRICAL REVIEW:

The twenty-second meeting of this association will be held in this city May 23, 24 and 25 next. The headquarters will be at the Murray Hill Hotel, Fortieth street and Park avenue. Hotel rates will be, on the European plan, $1.50 per day up, and on the American plan, $3.50 per day and upward, according to room.

The Electrical Exhibition Company will hold an exhibition in Madison Square Garden during the month of May, under the auspices of the association and in connection with the meeting. Very respectfully,

GEO. F. PORTER,
Secretary.

New York, January 9, 1899.

Wanted an electrical engineer capable of supervising, designing and installing all kinds of electrical equipments, both for direct and alternating currents. Also bell and telephone systems. Best of reference will be required. Address,

F. B.
Care Electrical Review, New York.

WANTED

Man familiar with ozokerite and petroleum compounds used for insulating. Good wages and steady employment for right man. Address

Z. SMITH,
P. O. Box 1006, N. Y. City,
stating experience, etc.

PROPOSALS FOR LIGHTING.

SEALED PROPOSALS will be received at the Borough Clerk's office, Sea Isle City, until 7 p. m., January 28, 1899, for lighting the Borough of Sea Isle City, N. J., with either incandescent or arc lights. Specifications may be obtained by addressing A. H. SICKLER, Mayor, 516 Minor St., Phila., or J. T. CHAPMAN, Borough Clerk, Sea Isle City, N. J.

Save Your Eyes
—concentrate the rays of light where light is needed—by using an
Espersen Adjustable Shade Lamp
Adapted to use at any desk, table, piano, typewriter, bench, etc., where incandescent electric light is obtainable. Increases light 50 per cent. Adjustable to any position. Completely shades the eyes. Handsome illustrated catalogue and price list free. Good agents desired in each city. Address
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We will send this adjustable table lamp to any address in the U.S., express prepaid, upon receipt of.....$2.25
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Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JANUARY 3, 1899.

617,139 Electric block system for railways; H. Baluss, Jr., Wayne, Mich.—A trolley line composed of portions of the main trolley wire and detached sections of trolley wire in advance of and in the rear of a series of stations, and a system of circuit controller comprising one in position to be operated by the trolley while upon a detached section and leaving a station to disconnect the current from a detached section at the next station in advance of the car, and a second to cut off the current from the detached section which the trolley has left.

617,145 Telephone exchange switch and signal apparatus; W. W. Dean, Boston, Mass.

617,165 System of electrical distribution; S. Kirlim, Watertown, S. Dak.—Consists of a primary circuit, a secondary circuit, two or more transformers, common to both circuits, and a responsive device in the primary circuit, that will automatically control the number of transformers included in the said circuits, to correspond with the increase and decrease demands of the said secondary circuit.

617,170 Combined lightning arrester and fusible cutout; B. L. Lawton, Meriden, Ct.

617,187 Means for generating electricity from machinery of locomotives; H. F. Roach, St. Louis, Mo.

617,192 Electric propulsion of vehicles; F. W. Schneider, Triberg, Germany—The improvement for the working of vehicles with accumulator propulsion, in which the main battery, when starting, is put in circuit parallel with a small auxiliary battery, constructed for quick discharge, for the purpose of supplying the additional current required at the start, essentially from the auxiliary battery and thus avoiding a high rate of discharge from the main battery and augmenting its efficiency.

617,193 Electric switch; O. H. Schuck, Philadelphia, Pa.

617,216 Pilot-wire rod for electrical conduits; J. Arnot, Kearny, N. J.—Consists of a shaft, head and foot pieces provided with radial wings serving as runners, the said head and foot pieces serving as abutments preventing the overlapping of sections within the conduit.

617,275 Quick-break electric switch; W. F. Bossert, Utica, N. Y.

617,287 Circuit-closer; J. D. Garlock, Palmyra, N. Y.

11,706 Reissue. Electric buoy; E. W. G. C. Hoffmann, Charlottenburg, Germany.

ISSUED JANUARY 10, 1899.

617,314 Telephone; W. E. Burns, Adams, Ind.

617,325 Railway signal system; F. C. Esmond, New York city.

617,326 Fire-alarm; G. W. Fallin, Sherman Heights, Tenn.

617,375 Electrical resistance; J. F. H. Voigt, Bockenhein, Germany—An electrical resistance consisting of a suitable base piece, an enamel layer secured thereto, and a conducting layer of fired liquid metal.

617,381 Electrical transformer; D. H. Wilson, Chicago, Ill.—Consists of a coil of wire having a metallic magnetic circuit, a second coil of wire, the core of which is part of said magnetic circuit, said second coil being movably mounted in said magnetic circuit in such a manner as to be moved out of its normal position when the first-mentioned coil is energized, and a circuit-varying device connected with said movable coil so as to be operated thereby.

617,382 Telephone system; D. H. Wilson, Chicago, Ill.—Consists of an induction coil provided with a movable core, a circuit-breaker associated therewith and operated by the movement of said core, a receiver, a transmitter, a signal device, a system of circuits so arranged that the circuit-breaker is in circuit with the primary coil when the signaling device is operated, and is cut out of circuit when the transmitter is being used.

617,418 Electrical measuring instrument; G. T. Hanchett, Hackensack, N. J.—A Wheatstone bridge, consisting of the circuits thereof, a circuit-closer for the battery and a circuit-closer for the bridge, both attached to a single movable handle.

617,503 Circuit-breaker; P. R. Goldey, Philadelphia, Pa.

617,526 Apparatus for electro-deposition of metals; E. Emerson, Buffalo, N. Y.—Consists of a cylindrical cathode, a series of horizontal anode-bars in proximity thereto, and curved supports therefor composed of lead, with lugs or ribs forming receptacles for the anode-bars, whereby the latter are maintained out of contact with each other and in the same relative position as they are dissolved.

617,540 Electric signal; C. A. Parrish, Jackson, Mich.—A track instrument comprising a spring-supported bar arranged parallel with the track rail and having its central portion higher and its ends lower than the rail top, a conducting plate projecting laterally from said bar and insulated therefrom, separated contacts normally engaging the upper side of said conducting plate, and circuit connections to said contacts, whereby the passage of a car-wheel over said bar will break the normally closed circuit between the contacts and said conducting plate.

617,543 Electro Therapeutic and Massage Apparatus; O. Schneider, New York city—An electro-motor, a roller electrode, a flexible shaft connecting the flywheel driven by the motor with the roller electrode, couplings for connecting said flexible shaft with the flywheel and the shaft of the roller electrode respectively, a handle frame for said roller electrode, and means for supplying an electric current to said roller electrode.

617,546 Controlling Electric Motors and Trains; Elihu Thompson, Swampscot, Mass.—Consists of a plurality of separately actuated contacts for varying the motor speed, electro-magnets for controlling the contacts, and means for controlling the magnets from a distance.

617,592 Electric device; David Misell, New York city—A tubular casing, a translating device at one end, a battery, the cells of which are arranged end to end in the casing, one pole of the battery formed by the cells being in direct contact with a permanent terminal of the translating device, and with a cover for the casing at one end, and suitable means for closing the circuit.

617,598 Automatic regulator; G. S. Neeley, Pacific, Mo.

617,601 System of control for electric motors and railway trains; W. P. Potter, Schenectady, N. Y.—A system of train control for an electric railway, comprising a number of motor cars, each of which is provided with a controller for its motor, the controllers being in parallel between the source of supply and the ground, step-by-step actuating devices for each controller, a circuit or circuits including the step-by-step actuators, and a regulator in the circuit or circuits governing the actuators.

617,608 Electrical cutout; A. P. Seymour, Syracuse, N. Y.

617,621 Electric headlight lamp; H. P. Wellman, Ashland, Ky.—An electric headlight lamp having positive and negative carbons, an enclosure for said carbons, means to which said enclosure is secured for adjusting said carbons, and means for axially rotating said enclosure, whereby said carbons may be relatively adjusted.

617,664 Automatic alarm mechanism for electric motors; R. W. Traylor, Richmond, Va.

617,691 Telephone switchboard; J. M. Overshiner, Ellwood, Ind.—A telephone switchboard, comprising a series of combined drop devices and jacks, each comprising in a single structure a magnet, a drop, a latch device for the drop, a rocking jack having a socket in its end for the reception of a plug and contact pins cooperating with said jack.

617,692 Telephone switchboard; J. M. Overshiner, Ellwood, Ind.

617,702 Annunciator drop device; W. O. Meissner, Chicago, Ill.

Electrical Construction at Richmond.

It is reported that a syndicate headed by a local trust company is endeavoring to effect a consolidation of the Richmond Traction Company and the Richmond Railway and Electric Company. The former is controlled by Messrs. John L. Williams & Company, of Richmond, and Messrs. Middendorf, Oliver & Company, of Baltimore. It is capitalized at $300,000, and has outstanding bonds to the amount of $500,000. The Richmond Railway and Electric Company is capitalized at $1,000,000, and has bonds outstanding to the amount of $2,600,000. If the deal is consummated, all the street railways will be operated under one management, and there will be a material saving in expenses.

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Kindred.... ...Interests

The United States Battery Company has moved to 253 Broadway, New York, in the Postal Telegraph Building, where a fine suite of offices have been secured. The company has also just fitted up its factory in Brooklyn and is turning out in great quantities its battery electric lamps of various kinds. "The Friendly Beacon," a house lamp, has made a pronounced hit, and the demand is quite phenomenal.

The very simple patented device is very often of more value to the users and the originator than a more complicated piece of apparatus The Ritter soldering iron attachment is an example of the value of a very simple device. As the name partly indicates, this is a small soldering iron tip designed to be attached to the burner of an ordinary gasoline blow-torch. The tip may be attached or removed instantly with an ordinary screw-driver, and is capable of doing all of the work of an ordinary soldering iron. It has the advantage of being light and convenient to carry around, and of being always hot and ready for use as long as the torch is burning. The Electric Appliance Company, Chicago, are introducing this specialty, and state that they have no difficulty in selling one or more to every construction man to whom it is shown.

A Great Business Fully Set Forth —The fifty-fourth annual report of the New York Life Insurance Company, printed in another column, is a statement of unusual interest. The ELECTRICAL REVIEW is very naturally selected to present the company's statement to the electrical field, and the report sets forth a business of vast magnitude and importance with unusual detail, and gives the intending insurer just what he should wish to know concerning a life company which seeks his patronage. Over 73,000 new insurers took policies in the company during the year, their contracts covering over $152,000,000. The large companies find it necessary to do considerable new business to offset their losses by death, maturity and lapse; but the New York Life's gain in insurance in force was over $67,000,000. It was proposed a few years ago to limit by law a life company's risks to $1,000,000,000. There is little need of such a limitation, for the forces of disintegration are always at work, and no company's business has yet reached that limit; the New York Life's, however, now exceeds $944,000,000, and another year's gain equal to that of 1898 will carry it over the line. When Mr. John A. McCall became president of the New York Life, in 1892, he announced that he believed in a frequent and full accounting to policy-holders, and each succeeding report shows how well he keeps his word. The company has had its real estate valued during the year by insurance officials of the states wherein it is situated, and has made such reductions as reduce it to a four per cent interest earning basis.

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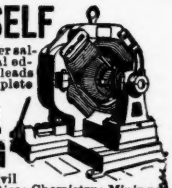
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